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Volume 9 **April, 1954** **Number 1**

CONTENTS

A Clinical Review of the Recruitment Phenomenon.
Joseph P. Linden, Jr., D.O., Los Angeles 3

Reduction of Vitreous Loss in Intracapsular Cataract Surgery.
Herbert Weinberg, D.O., Philadelphia 7

Ear, Nose, and Throat Miscellany.
Walter V. Goodfellow, D.O., Los Angeles 11

Tracheotomy. Its Indications, Technic, and Care.
John W. Sheetz, Jr., D.O., Philadelphia 15

Anesthetic Accidents Related to Ophthalmology and Otorhinolaryngology.
Glenn F. Gordon, D.O., Glendale, Calif 18

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Vol. 9, No. 1, April, 1954

A Clinical Review of the Recruitment Phenomenon

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Since the introduction of the term "recruitment" by Fowler[1] in 1937, progressively increasing scientific interest has been focused on that phenomenon. This has resulted in an extensive bibliography on the subject, with papers appearing in many different journals. Much of the published data is on the research level. This paper is written with the purpose of briefly reviewing the subject for the clinician.

Fowler[2] has defined recruitment as the abnormally rapid growth of loudness in certain ears. Other terms used synonymously are recruitment of loudness, Fowler phenomenon, and regression. The latter term appears particularly in European literature. Semantic difficulties may beset the student of recruitment literature. It therefore seems appropriate to differentiate the simple terms "loudness" and "intensity." In everyday life these terms are often used interchangeably. However, strictly speaking, the term "intensity" as applied to sound refers to the amplitude of the vibratory wave created by the sound source. In the same strict sense, the term "loudness" refers to the psychologic interpretation of the sound intensity by the listener. In pure tone audiometry, sound intensity is measured in decibels, referring to the intensity level at the earphone of the instrument. An example will indicate the necessity for a clear concept of these points. In a patient with a unilateral hearing loss of 20 decibels at one frequency, a sound of 20 decibel intensity at that frequency would be perceived as being moderately loud by the normal ear, and as being just barely perceptible by the poorer ear, the sound being presented alternately to each ear. Thus the loudness perception for each of these ears differs quite markedly, although the sound intensity remains identical for each ear.

Fletcher[3] has demonstrated that for the average normal ear in the frequency range 1,000 to 4,000 cps (cycles per second) any increase in sound intensity above threshold is perceived as an equal degree of increase in loudness. He found this to be true both for variations in intensity in one frequency, and in comparisons of two different frequencies in the above-mentioned range. However, certain diseased ears do not conform to this pattern. Referring to the previous example, in some pathologic conditions it would be possible that a sound of 60 decibel intensity presented alternately to each ear would be perceived as being equally loud in either ear. Thus an increase in sound intensity of 40 decibels (from the 20 decibel to the 60 decibel level) would be perceived as an increase of 40 decibels in loudness by the normal ear, and as an increase of 60 decibels in loudness by the deafened ear. Stated another way, in such a case there would be a disproportionate growth of loudness in the pathologic ear, that is, recruitment.

Threshold audiometric testing is based on the assumption that usable hearing function can be estimated from minimum audible determinations. This is a reasonable assumption if abnormal ears conform to the above-mentioned data of Fletcher.[3] However, the ear which exhibits recruitment deviates from this pattern. Recruitment testing is, therefore, a suprathreshold study. When one considers that average normal speech has an intensity of 55 to 65 decibels, the importance of investigating the patient's auditory performance at suprathreshold levels is quite clear. Where threshold and suprathreshold auditory functions parallel each other (as in the normal ear in the 1,000 to 4,000 cps range) recruitment does not exist.

Knowledge of the existence of some phenomenon causing discrepancies in loudness perception in certain ears is apparent in very early literature. Fowler[4] has the distinction of being the first to detect recruitment with the pure tone audiometer. The original testing procedure established by Fowler[5] is called the binaural loudness balance test. It consists of alternate presentation of the test tone to the better and poorer ear, determining for several different suprathreshold intensities the increase in intensity required by the poorer ear to achieve loudness balance with the better ear. Thus one may test in progressive 10 decibel steps in suprathreshold intensity for the better ear, determining the intensity level necessary to balance loudness perception by the poorer ear at each step. Because such testing is limited to monaural deafness (requiring one good ear for comparison), Fowler[6] later developed a monaural loudness balance test. In this procedure, an uninvolved frequency is compared with a frequency in which hearing loss is present. In a recent paper reviewing several recruitment testing methods, Bangs and Mullins[7] stated that the tests of loudness balance are probably the most valid of the many procedures in use. These tests have the disadvantage of limited application because they require one good ear or one good frequency. Further, the tests cannot be performed where the hearing loss in the poorer ear is near the intensity limits of the audiometer.

Another group of recruitment tests involves the determination of the difference limen for sound intensity. The difference limen for a sensory function may be defined as the minimum detectable change in stimulation. Jerger[8] credits De Mare and Brinitzer with the original hypothesis that the loudness function could be inferred from difference limen determinations. In the same paper, Jerger refers to a study by Newberger in which comparisons were made between difference limen and loudness balance tests in fourteen cases of monaural deafness. Complete parallelism of results was demonstrated, all cases evidencing recruitment by the loudness balance test exhibiting a smaller difference limen. Difference limen tests have been proposed and/or modified by Bekesy,[9] Lüscher,[10] Denes and Naunton,[11] Jerger,[8,12] and others. These procedures have the advantage that they may be utilized in cases of binaural deafness, as the performance of an ear is compared with the performance of normal ears, rather than with the fellow ear. The disadvantage of difference limen tests is that they usually are performed at one or two suprathreshold points only, leaving great areas untested. As will be pointed out later, recruitment varies in rate and degree in different subjects. Thus testing procedures which do not test several suprathreshold points may conceivably fail to detect some cases of recruitment.

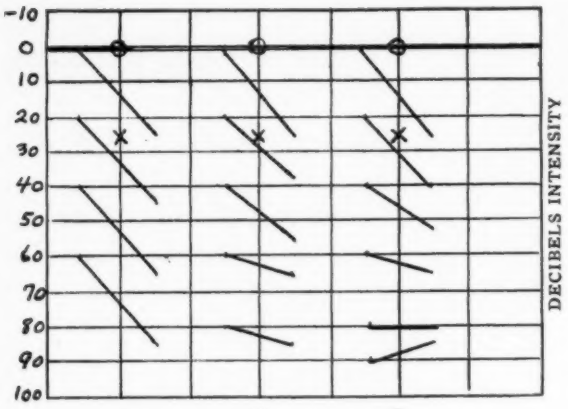

Fig. 1

Typical laddergrams obtained by loudness balance tests, illustrating differences in degree of recruitment.

A = Configuration when no recruitment present.
B = Incomplete recruitment.
C = Complete recruitment at 80 decibel level, hyper-recruitment at greater intensities.
O and X represent threshold for right and left ears respectively.

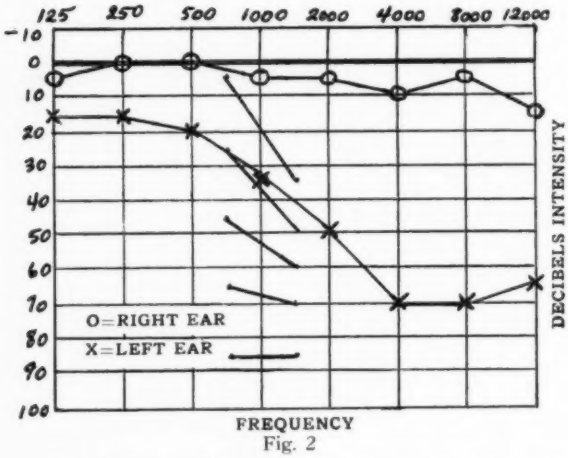

Fig. 2

Hypothetical audiogram of monaural left deafness, with laddergram of loudness balance tests at 1000 cps. Note that recruitment is complete, that is, sound is perceived as equally loud at 85 decibel intensity, although a 30 decibel difference in threshold perception exists.

Fowler[2] has suggested two methods for charting recruitment findings on loudness balance tests (Figs. 1 and 2). The first utilizes the standard audiometric chart. For each balance obtained, the intensity (in decibels) setting for the better ear is recorded on the line one-half octave to the left of the frequency being tested. The intensity necessary for loudness balance in the poorer ear is recorded on the line one-half octave to the right of the frequency under test. These two points are then connected by a straight line. When loudness balance is tested at several suprathreshold intensities for one frequency, a series of such lines can be drawn, the resulting configuration being termed a "laddergram." The initial "rung" of such a laddergram can be drawn for any frequency on a binaural threshold audiogram by connecting a point one-half octave to the left of a frequency at the intensity level of threshold for the better ear with a point one-half octave to the right of the same frequency at the intensity level of threshold for the poorer ear. The length and slope of such a line will be directly proportional to the comparative hearing loss of the two ears. When monaural deafness exists without recruitment, all of the "rungs" of the laddergram for a frequency are approximately the same length and have the same slope. Conversely, differences in the length and slope of the lines of the laddergram indicate recruitment. In the previously stated example, at 60 decibel intensity both ears perceived the sound as being equally loud. Thus at the 60 decibel level, the "rung" of the laddergram would be horizontal, extending from a point one-half octave to the left of the frequency line to a point one-half octave to the right of said line.

The second method of recording recruitment data utilizes a square graph, the abscissae representing the intensity of the sound source, and the ordinates representing loudness perception (Fig. 3 and 4). Assuming a monaural deafness, the plotted points for the normal ear would fall on the diagonal of the square, as each increase of one unit of intensity would result in an increase of one unit of loudness perception. In the same case, if recruitment were not present, the plotted line for the poorer ear would be parallel to the diagonal, but at a different (lower) level on the graph. If recruitment was present in the poorer ear, the plotted line for that ear would ascend the graph more steeply than does the diagonal line, and the point at which the two lines crossed (if such a situation did occur) would indicate the intensity of sound necessary to produce equal loudness perception in both ears.

When many ears exhibiting recruitment are tested, certain variations in pattern are noted. It is convenient to classify the degree of recruitment as follows:

1. Absence of recruitment. Growth of loudness equal at all suprathreshold levels for both ears.

2. Incomplete recruitment. Abnormal growth of loudness in the poorer ear present, but no suprathreshold intensity found at which sound is perceived as equally loud in both ears.

3. Complete recruitment. Abnormal growth of loudness in the poorer ear, with attainment of equal loudness perception at some suprathreshold sound intensity.

4. Hyper-recruitment. At some suprathreshold intensity the sound is perceived as being louder in the poorer than in the better ear.

Harris, Haines, and Myers[12] have shown that recruitment may develop at a different rate in some ears. Thus they have established four types of recruitment curves (as plotted on the square graph described above):

1. Straight line. The rate of recruitment is equal at each suprathreshold intensity, resulting in a straight line on the graph.

2. Asymptotic. The rate of recruitment is greatest immediately above threshold, diminishing progressively as the test sound intensity is increased.

3. Delayed straight line. No recruitment present immediately above threshold. At a significantly elevated suprathreshold level, type one recruitment curve elicited.

4. Delayed asymptotic.

The variations in rate and degree of recruitment cannot as yet be correlated with specific pathologic lesions.

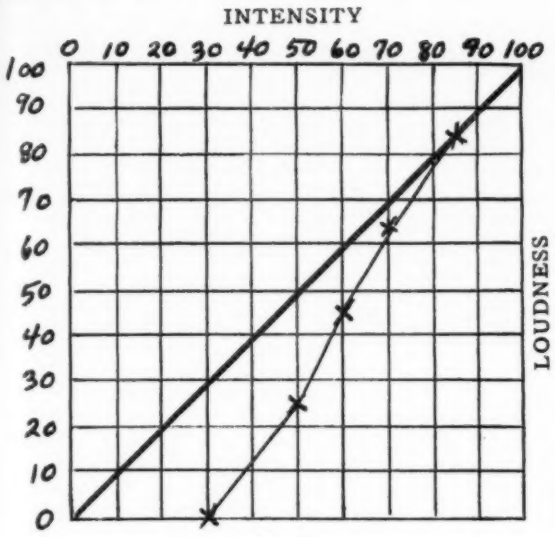

Fig. 3

Loudness balance at 1000 cps plotted on square graph using the same data as in Fig. 2. Note that the diagonal line represents the right ear, with the assumption that the ratio between intensity and loudness is normal for that ear. Thus there is 30 decibel difference in perception at threshold, and the sound is heard equally loud at 85 decibel intensity (point at which lines cross).

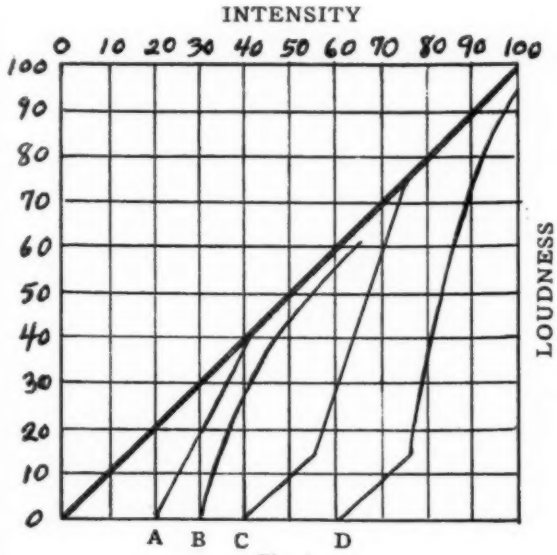

Fig. 4

Typical curves illustrating differences in rate of recruitment.

A = Straight line.
B = Asymptotic.
C = Delayed straight line.
D = Delayed asymptotic.

Lorente de Nó, quoted in Fowler,[14] has advanced the most acceptable hypothesis as the causation of recruitment. In essence, de Nó holds that each fiber of the auditory nerve is in contact with several hair cells in the organ of Corti. Impulses to a nerve fiber would consist of the total stimulation of all the hair cells in contact with the fiber. Thus, the minimum stimulus capable of perception would be one sufficient to move each hair cell enough that the total movement of the several hairs would result in discharge of an impulse in the nerve fiber. When some of the hair cells related to this nerve fiber are inactive (as in disease) or destroyed, the minimum stimulus capable of perception would be correspondingly increased. De Nó further holds that the nerve fiber has a natural refractory period which acts to limit the maximum number of impulses which may be transmitted per unit of time. He believes that only a portion of the hair cells related to a single nerve fiber are capable, when greatly stimulated, of "saturating" the nerve fiber with impulses. Thus the loss of function of a few of the hair cells of a nerve fiber would result in elevation of the minimum audible for that fiber, but great stimulation could still produce maximum loudness perception.

In the light of this explanation of the recruitment phenomenon, one would conclude that cochlear lesions alone should produce it. Fowler[6] has established that recruitment is characteristically present in nerve deafness, absent in conductive deafness. Dix, Hallpike, and Hood,[15] as well as Eby and Williams,[16] have shown that recruitment is usually absent in cases of perceptive deafness due to lesions of the nerve fibers (such as acoustic neuroma), while the phenomenon is usually present in lesions of the cochlea (such as Ménière's disease). The issue is complicated by Fowler's[17] statement that ambient noise and tinnitus may cause the recruitment effect. It is noted that none of the other prominent writers of recruitment literature mention the effect of tinnitus. In fact, the data on cases presented in recruitment studies often fail to state whether or not tinnitus was present in any (or all) of the cases. Perhaps some of the unexplained differences in rate and degree of recruitment may be attributed to the presence of head noise. Thus an additional classification of recruitment might distinguish between:

1. True recruitment. Abnormal growth of loudness due to cochlear lesions.

2. Pseudo recruitment. Abnormal growth of loudness due to ambient noise, tinnitus, et cetera.

Recruitment studies are useful in the differential diagnosis of hearing disorders. Fowler[6] has stated that recruitment tests are more reliable than tests of bone conduction, thus affording the clinician a more reliable means for distinguishing between conductive and perceptive losses. Further, recruitment studies may establish a basis for the differentiation of cochlear and retrocochlear lesions. The advantage of any procedure which will contribute to the differentiation of Ménière's disease from more serious lesions (such as eighth nerve tumors, cerebral trauma, etc.) is obvious. In cases of mixed deafness, Fowler[17] has outlined a procedure utilizing recruitment testing to measure the amount of hearing loss attributable to each component. Such an evaluation is of use in estimating the prognosis for medical or surgical care (fenestration, radium therapy, et cetera). The presence of recruitment certainly may influence both the design of hearing aid amplification system for greater comfort, and the need for artificial sound intensification. Harris, Haines, and Myers[13] have shown that, while recruitment for speech is approximately parallel to that for pure tones, the presence of recruitment adversely affects speech interpretation.

Many of the established recruitment tests require either special audiometers or rather expensive modification of the usual clinical instrument. However, a

few of the tests may be performed on the standard audiometer. The loudness balance tests may be accomplished by using one headphone, having the patient change it from ear to ear. This is not a very satisfactory method, due to the time factor between tone presentations. The Maico H fig. 1 audiometer (as well as some other instruments) is equipped with a balancing control. This control diverts the test sound gradually from one ear to the other. A simple method for establishing the presence of recruitment with this instrument is as follows:

1. Set balance control so that all sound is directed to the poorer ear.

2. Set intensity attenuator at 20 decibels above threshold for the poorer ear.

3. Slowly move balance control to divert some sound to the better ear, establishing the point at which sound is heard as equally loud in either ear.

4. Repeat for 30, 40, 50, 60 decibels above threshold for poorer ear. If recruitment is present, the balance control will have to be moved to divert more sound to the better ear at each increase in level of sound intensity. If complete recruitment is present, the balance control will be in the position midway between right and left ears at the point where equal loudness perception prevails. The loudness balance test is best performed at 1000 cps (if possible). Because the tones of suprathreshold intensity may be uncomfortably (and dangerously) loud for the better ear, it is best to present the tones in short bursts, rather than continuously.

Bangs and Mullins[7] describe the range of loudness test as a measure of recruitment. They hold this to be the most promising clinical test yet devised. The test consists of determining three points of auditory function for a sound frequency:

1. Threshold.
2. Level of comfortable loudness.
3. Level of uncomfortable loudness.

Recruitment causes relative narrowing of the range between points one and three. Some information as to the shape of the recruitment curve may be inferred from the relationship of point two to points one and three. As with the loudness balance test, this procedure is most applicable to monaural deafness. However, it is possible that future investigators will establish norms, permitting comparison of function of the pathologic ear with expected function. This would greatly increase the value of the test.

It must be borne in mind that any single laboratory procedure is seldom conclusively diagnostic. Further, the development of the recruitment concept is still rather young. The results of recruitment testing must always be considered in the light of all other features in the history and examination of the patient.

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THE VIRUS, THE CELL, AND THE POTENTIALITIES OF INFLUENZA

"I have spoken throughout as if influenza virus were no more than a laboratory tool, a subtle probe with which to explore the finer structure and functioning of the living cell. It would not be fitting, however, to end this lecture without reminding you that influenza virus is also an important agent of disease. It is a virus which even in 1951 killed heavily amongst the old people of Europe and in 1918-19 generated the third great plague of recorded history. Of all virus diseases influenza is probably that in which mutational changes in the virus are of greatest human importance. We can only guess what type of virus was responsible in 1918-19 and what changes took place during the course of the pandemic. But even in the period since the human virus was first isolated in 1933 there have been striking changes in the immunological character of both influenza A and B viruses. Some of us believe that the influenza virus' chief means of survival is its capacity for constant mutation to new serological patterns, and those of us who have had anything to do with the production of influenza vaccines know very well how that capacity can nullify the most painstaking work. Infectious disease today has lost most of its terrors, and in America at least the peaks of mortality that always mark the passage of an influenza epidemic are becoming smaller. But no one yet can say whether or when we shall see another pandemic outbreak of influenza. Until we know the answer to that question we should not be too complacent about our powers to deal with acute infectious disease. Even the most academic-seeming of investigations, like those I have described, may one day become matters of life and death."—Sir F. Macfarlane Burnet, F.R.S., in the Second R. E. Dyer Lecture, 1952, Public Health Service Publication No. 328.

Reduction of Vitreous Loss in Intracapsular Cataract Surgery

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Introduction of the intracapsular method of cataract surgery has made it possible to remove the cataractous lens before it becomes a serious economic and social liability. This is an obvious advantage over the older method of extracapsular extraction which necessitated years of waiting for maturation and frequent postoperative needlings. Despite this, many operators are reluctant to undertake intracapsular extraction because of the higher incidence of hyaloid membrane rupture with vitreous loss.

A basic premise of this paper is that the ophthalmic surgeon with average experience and surgical skill, if he will combine the knowledge of anatomic structures with proper use of the physical forces applied through his instruments, can adequately control the factors leading to this complication. Thus, with the incidence of vitreous loss reduced to the same or even less than that sustained in the extracapsular operation, the intracapsular operation may be considered the method of choice for the removal of all senile cataracts without regard to the stage of maturity of the cataract or the age of the patient.

The factors which are important in preventing rupture of the hyaloid membrane during the intracapsular procedure fall into three general classifications:

1. Adequate control of the intraocular pressure within the vitreous envelope.
2. Proper use of the mobile forces (applied to the eye and to the lens) which are transmitted through the instruments designed for actual removal of the lens.
3. Careful manipulation of the instruments used at all times during surgery.

CONTROL OF INTRAOCULAR PRESSURE

The factor of intraocular pressure is one which must be constantly considered from the moment surgery is decided upon until the lid sutures have been tied and the dressing applied to the postoperative eye. It must be remembered, of course, that chronic simple glaucoma and chronic iritis must be ruled out in every prospective surgical case. In addition, adequate preoperative medication must be given, thus insuring a calm, cooperative patient who will not, because of apprehension, squeeze his lids, move his head, cough, or speak during surgery.

With the intracapsular operation, in the interval during which the eye is open, the only force available to prevent vitreous extrusion is the almost nonexistent barrier of the hyaloid membrane and the iris diaphragm (in a round pupil extraction). Also, the limbal ring and the semirigid scleral bag behind it are not distensible, and any external pressure on an area behind the limbus is transmitted forward through the vitreous gel or liquid to the hyaloid membrane which is elastic, but only to a very limited extent. Thus, prophylactic control of all the factors causing external pressure must be adequate and operating with maximum efficiency from the time the lens is being removed until the eye is completely closed with sutures.

The first external pressure factor which must be considered is the weight of the lids. Theoretically, one of the functions of the self-retaining lid retractor and retracting lid sutures is to hold the lids away from the eye. From a practical standpoint, however, lid retractors are frequently a menace because they slip imperceptibly during surgery and sometimes the weight of the lid retractor pressing on the eyeball is another factor which causes pressure. A lid retractor held manually by a trusted assistant seems to be the only consistently dependable method of keeping the lids open and at the same time elevating them from the eyes. It also removes the necessity of performnig canthotomy in a larger number of cases with lateral lid pressure and helps immeasurably in cases with bulging eyes.

The second factor of importance is akinesia of the lids. From experience, I learned to combine a Van Lint injection method with an O'Brien block for maximum effective akinesia. One point, that the anesthetic must be injected just outside the margins of the orbital rim, is not made clear in textbook descriptions of the Van Lint method. If the anesthetic is injected into the lids inside the bony rim edema of the lids will occur with consequent pressure on the eyeball.

The time when akinesia is produced is also of importance. In the type of operation which I perform, the preliminary preparation of instilling a superior rectus suture, making a limbus-based conjunctival flap, putting in three double-armed corneoscleral sutures, and hemostasis often takes from 20 to 30 minutes. By the time the section is made with the keratome, widened with scissors, an iridotomy or an iridectomy performed, and the cataract removed, akinesia may begin to disappear, and lid squeezing results just at the time when it is most inopportune. To obviate this difficulty I evolved the routine of administering the injections for akinesia after the preliminary preparation mentioned above has been made and just before making the keratome incision. Also, to avoid hand and forearm fatigue of the assistant, a self-retaining blepharostat is used until the injection for lid akinesia has been given, at which time manually held lid retractors are substituted. Thus, by the time the new retractors are in place and the corneoscleral sutures straightened out, lid akinesia is effective, and the eye may be opened without fear that akinesia will wear off before the operation is finished even though the time of operation may be considerably increased if a complication is encountered.

I agree with Kirby's[1] conclusion regarding retrobulbar injection. He feels that retrobulbar injection gives excellent orbital anesthesia and akinesia although it often results in proptosis or increased intraorbital tension. This increased pressure may be due to edema of the tissues of the orbit or, occasionally, to intraorbital hemorrhage. For this reason I use a routine procedure of two anterior injections (two sites) of ½ cc. each of the anesthetic solution beneath the conjunctiva and Tenon's capsule. It was found just as satisfactory for anesthesia without the danger of producing retrobulbar pressure.

USE OF MOBILE FORCES

To make proper use of the mobile forces applied

to the eye and to the lens which are transmitted through the instruments, it is essential to have an understanding of the anatomy of the part and of the mechanics of action of the instrument in use. The proper concept of the make-up of the zonule and its attachment to the lens capsule assumes major importance.

The microscopic zonular fibers are glassy, elastic, structureless threads which are bound together by a thin interfibrillar substance. In saggital section it can be seen that the zonule consists of two distinct leaves or membranes, the anterior and posterior zonular layers. The zonule is then seen as a membrane which apparently begins on the anterior surface of the lens near the equator and disappears behinds the ends of the ciliary processes. The posterior leaf originates near the equator from the posterior surface of the lens, forms a backward concave curve and, together with the anterior membrane, follows the inner surface of the orbiculus back to the so-called posterior border of the zonule. There is a triangular space formed by the leaves of the zonule and the equatorial zone of the lens which is called the canal of Hannover, or the circumlental space.[2]

It is not quite certain that the retrozonular space, which is also known as the canal of Petit, the space between the posterior leaf of the zonules and the anterior surface of the vitreous, actually exists in the living eye. Its boundaries are not well defined because some of the zonular fibers of the posterior leaf cross the canal of Petit in various directions and are closely related to and connected with the surface membrane of the vitreous and also inserted into the substance of the vitreous.[2] Thus, the anterior leaf except for its origin and insertion may be considered to be relatively free during its entire extent and the posterior leaf an immobile one. The posterior leaf is anchored to the anterior face of the vitreous. There are some scattered fibers of the zonule communicating between the anterior and posterior sheets but for practical surgical purposes they may be disregarded.

In light of the anatomic findings, it is no longer accepted that the individual zonular fibers are ruptured or broken. Rather, it is felt that the mobile forces exerted upon the lens and zonules should be directed so as to separate or strip the zonular fibers from the lens capsule. Furthermore, it becomes apparent that each of the two layers of the zonular membranes has a different relationship with the face of the vitreous and, for this reason, the forces which separate each from the capsule should be of a different nature, exerted at different times and in different directions. Using the combination method of traction and expression to remove the lens intracapsularly, I feel that there are specific detailed differences in the maneuvers to be employed which are directly dependent upon the type of instrument used for traction. Since the most popular traction instruments in use today are the capsule forceps and the erysiphake, the discussion here will be limited to these two instruments.

Arruga[3] recommends grasping the capsule near the lower equator of the lens and pulling the capsule toward the center of the pupil; then lateral rocking movements are made and a hook is applied, folding the cornea behind the lens. The hook exerts pressure in the direction of the incision. Then lateral rocking movements are made to break the zonule of the upper part. This method uses only traction to separate the zonules from the lens capsule in the beginning but later combines expression with it.

Kirby[1] describes his method of simultaneous contrapoint application of pressure, traction, and rotation. After initially surveying the eye by palpating it just inside the ring of the cornea with the point of the lens expressor hook, he applies the blades for a vertical grasp in the lower pre-equatorial region of the capsule while the lens is supported by mild pressure with the lens expressor hook applied flat on the sclera beneath. Vertical traction is then made toward the surgeon simultaneously with contrapoint pressure, with the point of the lens expresser hook at 6 o'clock on the corneal dial just inside the corneal ring. He then attempts to rupture, peel, or otherwise separate the zonule just in that area. If this is done, further traction with the forceps and pressure will lift the lens as the zonule tears at the sides of the original area of separation. If the zonule does not separate, a shift in traction is made to one side and, because this traction creates a new line of tension in the capsule and zonule, contrapoint pressure is made there. If separation of the zonule is made successfully the tear can be extended by further traction and the delivery accomplished. If not, then the maneuver is repeated again in another area.

Using the method described by either Kirby or Arruga, when the lens capsule is grasped by the forceps, unequal lines of tension are produced in the capsule and transmitted to the anterior leaf of the zonules. At right angles to the direction of the forceps blades the zonules are put to a maximum amount of tension, but in the direction of the blades at the lower circumference of the lens the zonules are either in their normal state or on a minimum amount of tension. The operator must lift the capsule forceps considerably in order to create sufficient tension of the lower circumference of the anterior zonular sheet so that either the traction alone[3] or its combination with contrapoint pressure[1] may effect an anterior capsulozonular separation. If this traction is slight and made only in the vertical direction, then the unequal traction forces on the anterior zonular fibers are proportionally increased. But, if the traction is strong enough, then the entire posterior capsule is lifted away from the hyaloid fossa and the traction force may be transmitted through the entire posterior capsulozonular adhesion, lifting the posterior zonular layer as a whole away from its fixed position. If rotation or rocking traction is added, an unequal sideway shearing motion is set up between the entire posterior zonulocapsular adhesion. This may result in even greater traction on the entire posterior zonular sheet, possibly pulling out its attachments in the vitreous and predisposing to small dehiscences in the hyaloid membrane.

A sounder, more physiologic method of both anterior and posterior capsulozonular separation should include a concept in which the differences of anatomic insertions of the respective zonular sheets is considered. The maneuvers employed should separate the anterior capsulozonular adhesion with forces used exclusively for that purpose which would cause a minimum or no disturbance of the posterior zonular leaf. Once the separation of a large portion of the anterior capsule and anterior zonules is effected, maneuvers to separate the posterior capsule from the posterior zonular sheet should begin by affecting the smallest possible arc of this adhesion, leaving the posterior zonular leaf in its normal anatomic state of insertion in the anterior vitreous face.

In consideration of these principles then, the forceps should be applied diagonally to the anterior cap-

sule with little or no traction after the blades are closed. Contrapoint pressure should be applied at the area of greatest zonular tension, which is at the point at right angles to the direction of the forceps blades. When a separation of the anterior capsulozonular adhesion is made at this point, further gentle traction upward and toward the operator may be made, which will place the adjoining anterior zonules on a tension so that further contrapoint pressure on these areas may be effective. When the operator feels that the lower part of the anterior capsulozonular adhesion is severed, he may start the separation of the posterior capsulozonular adhesion. This is begun by gentle elevation of the lower circumference of the lens without rotation in an attempt to begin the separation within as small an arc as possible. Once the operator feels that separation has started he may then extend this gentle motion of elevation to the adjoining arcs of the lower posterior capsulozonular adhesion. This motion will separate most of this adhesion and, at the same time, serve to separate the rest of the anterior capsulozonular attachment. The lens may then be slowly lifted out in a rotary motion through the intact pupil.

It is my belief that the surgical principles expressed in this concept are original. Furthermore, the surgical maneuvers employed in using these principles may be more efficient and safer with a specific type of erysiphake than with capsule forceps.

Arruga[3] vaguely describes the use of the erysiphake for traction after applying the suction cup and getting a suitable hold of the lens capsule: ". . . breaking of the zonule should be accomplished by rotation of the zonule at the inferior border, pulling the lens upward and beginning its tumbling movement, that is, directing its inferior border forward and upward. If the zonule is resistant, its rupture may be started by making pressure with the flat of a hook or, better, with its tip, at the level of the inferior corneal limbus." Then he describes a tumbling method of extraction.

Kirby[1] declines to express his opinion on the subject owing to insufficient experience with the erysiphake, but he does quote Barraquer,[4] one of the instrument's foremost advocates. "When the vacuum is started, the lens instantly adheres to the cup. The diameter of the lens is reduced and fragile zonules are broken. But if the zonule is strong, the suction places it under tension which is favorable to rupture by the action of pressure with the forceps." He further describes a tumbling method of extraction.

In the proper use of the erysiphake, the tip is applied to the anterior surface of the lens capsule, and a negative pressure sucks up the anterior capsule together with a small amount of lens material. This puts the entire 360 degrees of the anterior zonular leaf on a tension without traction or rotation of the instrument. The operator may then gently stroke downward on the lower limbal line to separate the lower half of the anterior zonular layer from the lens capsule without any apparent disturbance of the posterior leaf of the zonules. The erysiphake handle is held loosely in the hand with just enough support to approximate it to the lens surface and to help steady the lens. If any additional motion is necessary to place the zonules on a tension, it is my opinion that the erysiphake should be pulled slightly, straight up in a direction through the corneal center line as advocated by Nugent.[5]

When the iris begins to balloon out in the lower third of its circumference the operator knows that the greater part of the lower anterior zonular membrane has been separated from the lens capsule. Then he very slowly elevates the lower pole of the lens and begins a separation of the posterior capsulozonular adhesion at that point. This motion is gradually and gently extended to the adjoining lateral margins of the lens so that there is a separation of most of the remaining anterior and posterior zonular sheets still adherent to the lens capsule. When the equator of the lens is seen just behind the pupillary edge of the iris, the handle of the erysiphake is gently rotated in such a fashion as to cause the upper edge of the lens to slip past the pupillary margin at 12 o'clock, and the lens is tipped about 20 to 30 degrees.

Contrary to the practice followed by many operators with either the capsule forceps or the erysiphake, I believe that the pressure force used to strip the zonules should not be changed in direction and be used as a force of expression, folding the cornea behind the lens to help lift out the lens so that the capsule might be spared from rupturing. As soon as it is apparent that the lower part of the anterior zonular membrane has been detached, the instrument of contrapoint pressure should be completely removed from the cornea and the rest of the lens removal maneuver made by traction alone from either the capsule forceps or the erysiphake which is now able to hold the lens and extract it safely without breaking the capsule.

MANIPULATION OF INSTRUMENTS

The following principles apply to the use of the capsule forceps or the erysiphake. The forceps blades or the erysiphake cup should be applied to the center of the lens or very slightly eccentrically, even though the thinnest part of the anterior capsule is at the center. It is important to avoid the zonular attachment which is just below the lower edge of the iris when the pupil is 8 mm. in diameter. The contrapoint pressure in either case is applied exactly at right angles to the direction of the blades if capsule forceps are used, and just on or just inside the limbal line because this line is directly over the part of the zonule between the ciliary body and its attachment to the lens. If pressure is made behind the limbus the lens will be lifted by pressure transmitted through the ciliary body and vitreous, and this may cause a vitreous prolapse. Sliding the lens out is preferable to tumbling because the lens is a smooth, moist convex surface in opposition to the smooth, moist concave surface of the vitreous (hyaloid fossa). There is a force of cohesion present which, according to physical laws, is more easily broken by a shearing or rotatory motion. If the lens is lifted out of its fossa the cohesive force between the two may pull the hyaloid forward, possibly leading to its rupture. Also, tumbling predisposes rupture of the capsule and produces greater pressure on the face of the vitreous and a possibility of damage to the endothelium.

I prefer the Nugent cataract vacuum pump which delivers a measurable continuous fixed negative pressure that can be varied according to the case and the Nugent-Green-Dimitry vacuum cup with oral control. The Dimitry syringe erysiphake, the Bell rubber bulb, and all of the other manually controlled erysiphakes deliver a negative pressure which is neither measurable nor continuous and, in my opinion, dangerous and more difficult to handle.

Careless handling of surgical instruments with consequent vitreous loss is inexcusable. I have seen instances in which loss of vitreous occurred because the operator, during the heat of the maneuver, used fixa-

tion forceps and inadvertently fixed the eyeball with pressure instead of slight elevation. I have seen other cases in which a Burch pic was used for fixation during a keratome incision. After removing the keratome from the anterior chamber, the operator held the pic down with pressure. As a result, in one instance a lens was dislocated. In trying to imitate my chief's method of performing peripheral iridotomy, I made the incision with De Wecker scissors without first elevating the iris with forceps. The scissors pierced the zonules and entered the vitreous which immediately escaped. The superior rectus suture should be loosened before the corneal incision is made; otherwise it tends to become a source of external pressure.

If after making the corneal incision the aqueous escapes quickly from the anterior chamber, the pupil will contract regardless of the preoperative mydriatic used. In performing a round pupil extraction, the contracted pupil may be dilated by irrigating the anterior chamber with a 1:1000 epinephrine solution. This will help prevent an irregularly shaped pupil and facilitate delivery through the pupil with less risk of loss of vitreous.

If an iridectomy has been performed, the iris spatula used for replacing the pillars of the iris should be introduced over the iris and remain on the iris. Under no circumstances should it be permitted to extend beyond the iris. Caution must be exercised in irrigating the anterior chamber after lens removal for the direction and force of the water may create sufficient pressure to rupture the anterior hyaloid membrane.

There are two other special circumstances in which an intracapsular lens extraction is deemed necessary. The first is the removal of a dislocated lens. In order to minimize vitreous loss,[6] it is best to anchor all of the rectus muscles with sutures as is ordinarily done with the superior rectus muscle. Thus, the eye is suspended like a bag of water at four points, and when the lens is looped out there is less tendency for vitreous loss. If the vitreous is liquid or almost so, and the lens has been dislocated and gravitated to a dependent position, a recommended maneuver is to irrigate the open eye with physiologic saline, thereby floating the lens to the surface where it may be looped out safely and easily. This is preferable to going deep into the vitreous with a loop or hook in an attempt to get the lens. With the latter procedure, retinal damage may result.

The second special type of case is that in which there is a penetrating wound of the cornea and the lens. If it is believed that penetration through the lens into the vitreous has occurred, immediate section and intracapsular removal of the lens is justified, despite the inevitable vitreous loss which will occur. If the treatment is expectant and the lens does not absorb completely, as may be the case in adults, a later attempt to wash out the remaining lens material and nucleus usually results in a mixture of lens protein and vitreous which will produce a membrane so tenacious and thick that it is virtually impossible to needle it. Such eyes will give poor functional results.

SUMMARY

An attempt has been made to demonstrate how the incidence of vitreous loss during intracapsular cataract extraction may be decreased by a thorough knowledge of the anatomic structures with a proper application of the mobile forces employed, a basic tenet of osteopathy. A physiologic and an anatomic basis has been given for each recommended maneuver. The erysiphake, particularly one which gives a continuous, fixed, measurable negative pressure, combined with a vacuum cup with oral control, is preferred to the capsule forceps and is the instrument of choice for intracapsular cataract operations.

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TUBERCULOSIS: A TIME FOR DECISION

Because the gains in the fight against tuberculosis have been substantial, we can accept rather cheerfully the fact that Pasteur was altogether too optimistic in his opinion that infectious disease could be banished from the earth and that Allen Krause in forecasting that the trend of tuberculosis rate would bring it to zero in 1935 was quite wrong. Tuberculosis we still have with us, but it is in manageable dimensions, at least as far as the Western World is concerned. Many persons now forecast that tuberculosis may become a minor cause of death in Western Europe, in North America, and in Australia before we know the reasons for this event. That would be good for humanity but a black eye for science.

By any scale of values, however, the 90-percent reduction in mortality rates in this country from 194 per 100,000 population in 1900 to less than 20 in 1951 is an outstanding performance. But there must be no complacency in our view of the tuberculosis that remains among us. It is not the time for a change in the energy and relentlessness with which the disease has been attacked. National averages are misleading. Tuberculosis mortality now is 3½ times as high in the nonwhite population as among white citizens. Iowa and Minnesota may have rates of less than 10 per 100,000, but Alaska and Puerto Rico have rates 6 to 10 times the national average.

Even though statisticians believe that 1952 figures will show it to be ninth among the causes of mortality, and although it now accounts for only 2 percent of deaths in the country as a whole, tuberculosis is still a leading cause of death among young adults. In monetary terms, national efforts to control this disease are costing the American people more than $350 million a year—a figure which does not take into account the cost and depreciation of hospital buildings or the training of professional personnel. If we try to estimate the loss in family incomes when the wage earner is separated from his family for sanatorium care over long periods, and the fact that even though his life may be saved and his disease arrested he dares not go back to hard physical labor, the cost totals become astronomical. If one attempts to estimate the cost to the community of the broken homes so often resulting from tuberculosis either of father or mother, we would unhappily agree that tuberculosis still stands close to the top as a social tragedy, possibly exceeded only by mental disease.—Thomas Parran, M.D., *Public Health Reports,* October, 1953.

Ear, Nose, and Throat Miscellany

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In this paper I have assembled bits of information concerning office treatments of common ear, nose, and throat problems which may be valuable to others. This knowledge has been gained through the many years that I have been in practice. Every physician develops certain pet treatments which I think it is wise to pass on to others. With this in mind I shall endeavor to give some of my "tricks of the trade."

LOCAL ANESTHESIA

I believe that most procedures which are undertaken, both medically and surgically, particularly in the nasal tract, depend, quite largely, upon efficient local anesthesia. With a properly anesthetized organ it is possible to have good visibility and a quiet patient, making the objective easier to accomplish.

Synthetic local anesthetics are not as efficient in producing topical anesthesia as is cocaine. Cocaine has fallen into disuse largely because of its bad reputation which it never deserved. In the early days of anesthesia cocaine was the only anesthetic used and frequently was made into cocaine mud. A cotton applicator was saturated in epinephrine and rolled in crystalline cocaine. This assured the operator of a fresh solution but not an accurate dosage.

I use a 20 per cent solution of cocaine for topical application followed immediately by a topical application of 1:1,000 epinephrine, then another application of cocaine and epinephrine. Following this, cotton packs, 2½ or 3 inches in length and ½ to ¾ inch in width, are saturated in epinephrine and placed over the area to be operated on and left in situ for 20 to 45 minutes. Upon their removal it will be found that the area is not only insensitive but it is also ischemic, and surgical procedures can be performed without bleeding.

Topical anesthesia is preferable to parenteral anesthesia in the nose because the sensory nerve endings are in the mucous membrane external to the perichondrium and periosteum. It is difficult to put an injection external to the perichondrium and periosteum, and, therefore, in most cases of parenteral administration the fluid is injected beneath these membranes, which separate the perichondrium and periosteum from the sensory nerve endings.

Topically applied anesthetic agents are readily absorbed by the mucous membrane. The use of epinephrine will cause a rapid diminution in the size of the small blood vessels and thus localize the anesthetic and tend to prevent general systemic absorption.

The one emphatic warning which I desire to give is that cocaine solution should never be more than 2 or 3 weeks old. Fresh cocaine does not produce so-called cocaine poisoning. It is the cocaine which has been in solution longer than this which is toxic and which produces a reaction. Because of the bad reputation of cocaine and the probable attitude taken by a court in the event of some disaster, the doctor is taking a risk in using it. However, if one is to avoid all risks in life he will not accomplish much, and I have taken this risk ever since I started specializing in 1910. During those 44 years my only case of cocaine poisoning occurred during my early years of practice and, looking back, I am sure a stale solution was the cause. Since that time I have not hesitated to use cocaine even though patients have warned me that their doctors said cocaine should not be used on them because they were susceptible to it, but I have never had another case of poisoning.

Because of the greater efficiency of cocaine in producing adequate anesthesia, it is desirable that it come back into general use as a local anesthetic.

EPISTAXIS

Nine out of ten cases of spontaneous epistaxis occur in the lower anterior portion of the nasal septum on one or both sides. Therefore, in about that proportion of cases, bleeding can be readily stopped by introduction of an epinephrine pack, made in the manner described above, into the lower anterior portion of the nose. It should be removed and reapplied at intervals of a few minutes until bleeding has stopped.

Patients who have recurrent bleeding usually give a history of having some dried encrusted secretions in this area which they remove either with a handkerchief or fingernail. By such removal the tissue underneath is traumatized, oozing of serum and blood takes place, and another crust is subsequently formed. Recalcitrant cases sometimes go on to ulceration and even to perforation of the septum.

In treating this condition it is necessary to get the patient's cooperation in the matter of nasal trauma; he must leave the dried crust over the wound until healing is completed and it is shed spontaneously. In order to make this crust bearable to the patient, two procedures are required: first, snuffing a normal salt solution (1 teaspoonful of salt to 1 pint of water) from the palm of the hand; and second, applying a small amount of plain Vaseline over the ulcerated area. Washing the nose will tend to soften the crust and remove it, and, if it does not, Vaseline reduces the dryness and makes the condition bearable. Resolution usually takes place in about 10 days.

In more aggravated cases blood vessels are dilated and covered by a thin membrane which ruptures easily. After this area is anesthetized, application of a 20 to 50 per cent solution of silver nitrate at intervals of a week or 10 days for three or four applications toughens the membrane and reduces the incidence of hemorrhage.

BROKEN NOSE

In treating all recently broken noses a few fundamental points should be observed. First, the nose should be thoroughly desensitized, as though for a submucous resection, by the technic described above. This will tend to reduce any bleeding present and produce anesthesia, thus making it possible to manipulate the broken bones into place. The most important procedure in setting the nose is to lift the bridge of the nose to give the fragments an opportunity to slip back into place, and this is best done with a straight-sided instrument such as an elevator used for a submucous resection. This instrument is slipped into the nose under the bridge, preferably on the side of the convexity, and, by lifting the nasal bones and pressing the perpendicular plate and cartilage back toward the median line, it will be found that in most cases they will snap into place and the septum will be straightened and will remain straight without any splints or bandages.

The ordinary tent which is put into the nose dry and which absorbs moisture and thus produces pressure deserves condemnation. Such splints are in common use in emergency and receiving hospitals, but seldom bring about the correction which they are supposed to make. Again let me emphasize that the most important procedure is proper administration of local anesthetic. The anesthetic and epinephrine applications must be made very high in the nose in order to anesthetize the areas which will have to bear the pressure.

THROAT INFECTIONS

One of the oldest remedies for infected tonsils, silver nitrate, is probably one of the best. When I say silver nitrate I do not mean Argyrol.

A 20 to 50 per cent solution of silver nitrate is invaluable in treating acute follicular tonsillitis. The method of application is important. A very fine malleable applicator should be used which can be bent at nearly a right angle; it should be wound with a very small amount of cotton to make a cotton mass no larger than the end of an ordinary small probe. The cotton is saturated with silver nitrate solution, and the excess is squeezed out against the neck of the bottle. This smoothly wound cotton applicator is inserted into the infected crypts of the tonsils. If from four to eight of these crypts in each tonsil can be treated with a 50 per cent solution of silver nitrate, the course of the infection will be arrested within 24 hours.

The only possible danger from the use of silver nitrate in the throat results from carrying an excess of it on the applicator, in which case it may find its way into the larynx and produce laryngeal spasm. This is so easily prevented that it should never occur. Silver nitrate also is specific for Vincent's angina involving the tonsils or other areas of the throat.

RANULA

There is difficulty in securing much information on this condition from textbooks. However, in some texts it may be discussed with pathologies of the salivary glands and ducts. The term "ranula" is applied to any swelling in the floor of the mouth but is usually associated with occlusion of the submaxillary duct. Often the occlusion of a duct is caused by a foreign body, most often a calculus.

Diagnosis is readily made by palpation with one finger under the floor of the mouth and the other inside the mouth; confirmation can be made by x-ray. Once established that there is a calculus in the submaxillary duct, it is not difficult either to slit the duct, if it is near the orifice, or cut down directly on the calculus wherever it is located and remove it. In most cases calculi are accompanied by pus. In such cases the orifice of the duct is dilated. In one case I inserted a very small, closely wound cotton applicator into the duct for palpation, and it came in contact with a rough jagged obstacle in the canal. When I removed the applicator, the object came out with it. Upon measurement it was about ¾ inch long and fully ⅛ inch in diameter. Subsequent lavage of the canal was all that was necessary to bring about a complete resolution in the case.

Nearly all calculi have surfaces studded with sharp, irregular protrusions. Such calculi become enmeshed in the cotton of the applicator, and being embedded in a lake of pus, are movable enough to be withdrawn.

The main symptom in such cases is pressure in the gland, especially at meal times, brought on by occlusion of its duct.

POSTNASAL MANIPULATION

Through the years I have been outspoken against the so-called reconstruction of the eustachian tube by means of postnasal manipulation, with its claims of wonderful benefits to hearing and cure of hay fever. However, there have been very few patients who have entered my office who have not undergone at least one postnasal palpation for diagnostic purposes. In the large majority a significant number of adhesions have been found to exist. These adhesions are not in the eustachian tubes but in the fossa of Rosenmüller. They are significant factors in nasal turgescence, asthma, and hay fever. Indirectly the adhesions cause deafness and should by all means by located and reduced for the benefit of the patient.

Treatment is simple, does not require anesthesia, and can often be performed in the office during the first examination. The technic that I prefer is to have the patient sit in a forward position in the chair and look down toward the knees. A towel is placed over the knees. In this position the cervical region is flexed so that there is room between the palate and the posterior pharyngeal wall for insertion of the finger. A cot is always used on the finger. The forefinger of the right hand is put into the right fossa of Rosenmüller, and, if adhesions are encountered, they are broken down and the parts stretched moderately. The left forefinger is used to sweep into the left fossa of Rosenmüller. Care should be taken to sweep the finger across the center between the two fossa to be sure that no central adhesions are left. In my hands no single office procedure gives more significant results.

SINUS INFECTIONS

With the advent of antibiotics many patients are being denied the necessary treatment for complete eradication of infection in their sinuses. When the diagnosis of chronic sinusitis is established, it is doubtful whether the patient ever gets more than temporary relief with antibiotics.

It is still my practice to treat chronic sinus infection by lavage through the normal ostia. The technic is not difficult. If the patient is anesthetized in the area of the ostia the procedure is painless. If the ostium is of normal size lavage will remove all purulent or mucopurulent material. The frequency of irrigations will depend upon the character of the material. As the discharge becomes less colored and smaller in quantity the time between treatments can be lengthened.

Sphenoid Sinus.—Probably the least difficult sinus to enter is the sphenoid. In many cases when infection is present in the sphenoid sinus the ostium will have a tendency to be stenosed; therefore, it is desirable to consider enlarging the ostium with the sphenoid punch. It has been my experience that those who have suffered removal of the anterior wall of the sphenoid sinus for the purpose of making a large window suffer discomfort and headaches which they would escape if the sphenoid ostium were enlarged only to normal size.

Frontal Sinus.—Entering the frontonasal duct is a more difficult procedure but it is not so difficult as it is generally considered. There is rarely a patient in whom the frontonasal duct may not be probed and the sinus entered for sinus lavage. It is significant that frontal sinus irrigations bring about more permanent results with less recurrent infection than lavage of other sinuses.

I have never performed a radical frontal operation, and I have never found such an operation neces-

sary or I would have done it. I have treated innumerable infected frontal sinuses and, in all patients, recovery was satisfactory after lavage through the normal frontonasal ducts.

The Antrum (Maxillary Sinus).—The antrum is in most cases fairly easy to enter through the normal ostium, although in some cases the ostium is in a difficult location. In such cases a puncture is easily made through the area where the lateral nasal wall is membranous and this may subsequently become the normal sinus ostium. I prefer, if a puncture is to be made, that it be made in the middle meatus rather than in the inferior meatus. I disagree with those who think a window in the inferior meatus is essential or desirable for the correction of chronic maxillary sinusitis.

Whether there is any merit in the instillation of any of the antibiotics or antiseptics into the sinus after the irrigation is still a moot question. The principal objective of irrigation of the sinus is removal of the pus which, of itself, is a cause of congestion and bacterial incubation. Frequent washing of the mucopus from the sinus facilitates the recovery of its membrane. Normal membranes secrete watery mucus which, in turn, restores the normal physiologic mechanisms of lavage which nature has established for the purpose of maintaining a healthy sinus.

When abnormal tissue such as polyps and granulation tissue occurs in the antrum, the cause is usually an apical abscess of one of the molar or premolar teeth. The diseased area in the alveolar process and the abnormal tissue must be removed to bring about a cure. I have found about 25 per cent of cases of maxillary sinusitis are of this origin. The technic which I employ, that is, entering the infected tooth area instead of the canine fossa as in the Caldwell-Luc operation, has given good results and it is a less formidable procedure. It can be an office procedure. The antrum is not packed. It is irrigated through the normal opening and through the wound for sufficient length of time to restore normal fluid secretions.

Antibiotics.—Probably the logical treatment in sinus infection is mechanical removal of the mucopus coupled with discreet use of antibiotics. In no case do I believe that nasal drops have any part in the treatment of sinus infection.

HYPERTROPHY OF INFERIOR TURBINATE BONES

Hypertrophy of the inferior turbinates is an abnormality frequently found in patients complaining of postnasal drip and nasal stenosis. Careful examination of the lower border and posterior end of the inferior turbinate bones will often reveal a swollen enlarged mass lying close to or upon the floor of the nose. The mass at the posterior end may be ball shaped and sometimes of large size. It can be raised by a cotton applicator, indicating that it is loose and pendulous. These soft hypertrophied areas need to be removed to free the inferior meatus so that secretions are not impounded there to slip backward over the palate into the throat and thus be labeled postnasal drip.

The technic is simple. A small straight scissors is the best instrument with which to take off the tissues along the lower border of the turbinated bone, and a small cold wire snare can be looped over the mass on the posterior end to snip it off. No other nasal operation that I perform gives so much satisfaction to the patient as this one. It does not rob the patient of the valuable anterior portion of the inferior turbinate bone, and, at the same time, it does reduce the engorgement and hypertrophy of the anterior portion of the nasal passage which tends to reduce nasal turgescence and opens up the respiratory passage in the entire nose.

Dr. Edward Davidson has devised a pair of scissors which I recommend for trimming the lower border of the inferior turbinates.

ASTHMA

No discussion of nasal problems would be complete without mentioning that the cause of true bronchial asthma resides in the posterior portion of the nose. Many contributing causes can bring on the asthmatic seizure; they include dust, pollens, intestinal parasites, dysfunctioning gallbladder, eating shellfish, a slipped rib, and a multitude of others. However, the asthmatic seizure will not take place from these causes alone unless there is dysfunction of the nervous mechanism of the respiratory tract, beginning with dysfunction of the sphenopalatine ganglion. The pathologies which I find producing dysfunction of the sphenopalatine ganglion are in the sphenoid region; infections of either or both sphenoid sinuses, polyps in this region, deviation of the septum which prevents a proper ventilation of the sphenoid sulcus, adenoids in children, and adhesions in the fossa of Rosenmüller.

HEADACHES

The rhinologist is often consulted about headaches because of the popular misconception that sinus infection is the cause of a goodly proportion of headaches. This is not true. Occasionally in the case of acute frontal sinusitis, headache will be present. This headache is a typical middle-of-the-day headache, coming on after the patient arises in the morning, reaching its peak about mid-day, and gradually waning during the afternoon hours. Usually such patients eat their dinner in comfort and do not have any discomfort during the evening. They sleep without pain only to have pain recur again an hour or two after arising the next morning.

Maxillary sinusitis rarely, if ever, produces headaches. The discomfort from them is usually associated with some discomfort through the cheeks and across the bridge of the nose, and, occasionally, in the region of the temple.

Sphenoid sinusitis will produce occipital headache radiating to one side or the other of the head, depending upon which sinus is infected. Those headaches originating in the back of the neck call for very thorough inspection and irrigation of the sphenoid sinus.

A headache similar to those caused by sphenoid sinusitis is due to adhesions in the fossa of Rosenmüller. With proper postnasal manipulation these headaches are frequently spectacularly cured. As a general rule, however, headaches are not a symptom of sinus infection.

VERTIGO

Vertigo as a chief symptom frequently causes confusion. The internist may assume that it is likely to be due to an involvement of the semicircular canals. The importance of establishing a correct diagnosis in cases of vertigo cannot be overemphasized for, if semicircular canal involvement is not a factor, other possible causes must be searched for. Vertigo is never present without deafness if it is caused by inner ear involvement. Therefore, hearing tests are important in determining whether the vertigo is of semicircular canal origin.

Ménière's syndrome or disease is characterized by a moderate vertigo, rarely to the point of falling, and

may occur at any time of the day, but never at night when the patient is recumbent. It occasionally causes nausea, but rarely vomiting, and it is always accompanied by deafness.

If there is a history of present or past pathologic ear conditions there is a greater likelihood that vertigo is due to inner ear involvement. Here again, however, the hearing test is the most accurate means of determining whether or not the semicircular canals are involved.

NASAL POLYPS

Patients should be told at their first visit that after polyp removal from 4- to 6-months' supervision will be necessary. During this time it frequently may be necessary to remove more polyps and to make a careful search for recurrent polyps. If this is done, nasal membranes will have an opportunity to return to normal, and smaller and smaller areas of the nose will be subject to polyp recurrence. If these are carefully searched for and the polyps removed, eventually the entire mucous membrane will be free from them. Only by such diligent follow-up treatment will satisfactory results be attained.

EAR POLYPS

Ear polyps are similar to the nasal variety and occur particularly in chronic cases of otitis media. The best means of removing them is by silver nitrate cauterization. The polyps are swabbed two or three times with 20 per cent cocaine and epinephrine, and a few minutes are allowed for penetration. A very fine wound cotton applicator, saturated with 50 per cent silver nitrate (being careful there is no excess), is insinuated around the base of the polyp, and the polyp is gently rolled from side to side and literally "cooked." A second application may be necessary. It is usually possible to lift out the polyp with the cotton applicator or with a very fine hook as the pedicle has been made friable by the silver nitrate. Bleeding is usually insignificant after this procedure. Since no instrument is small enough to remove these polyps by means of incision, the silver nitrate method is the most desirable since it also aids in eradicating the infection. With reasonable care there will be no harmful effects to surrounding tissue.

FUNGUS OF THE EAR

Fungus of the ear is characterized by thick pasty masses of pale-colored material, usually partially or completely filling the external canal, causing a tendency to deafness and itching and discomfort. Rarely is there any pain. If there is an excess of mycotic material in the canal, it should be washed out.

Treatment then consists of irridation with cold quartz applicator for from 25 to 40 seconds or longer. Subsequently, if the skin reaction indicates a sufficient resistance to ultraviolet radiation, the time may be lengthened. Following this treatment the canal is painted with crystal violet and brilliant green stain. I find this stain is superior to gentian violet and other stains in fungus infections.

The patient is given ear drops consisting of a saturated solution of boric acid in which 25 per cent pure ethyl alcohol is dissolved. The method of application is important. No swabs should be used in the ear by the patient. The drops for home use are placed in the ear by means of a dropper from the bottle. Half a dropper of the solution is placed in the canal, and the head is then turned to the side and the fluid allowed to flow out. Two or three such fillings of the canals constitute a treatment and should be given by the patient himself three times a day. Another application of cold quartz and crystal violet should be given 4 to 6 days later as indicated. Usually three or four such treatments are required.

HEARING TESTS

After years of diagnosis of various types of deafness and the study of audiometers, tuning forks, and the like, it is my conviction that one C^2 tuning fork (512 double vibrations) is sufficient for accurate diagnosis in hearing defects in about 90 per cent of cases since the only evidence in hearing tests is what the patient can give in response to the tests. Whether the sounds come from a tuning fork or an audiometer, the physician is still dependent upon the patient's response. The tests are for the purpose of determining the type of deafness and the probable pathologic condition present. Bone conduction and air conduction tests differentiate accurately between nerve deafness and conduction deafness.

CATARACTS

Plain Haliver oil without viosterol, 1 or more drops in the eye at bedtime, stops the progress of opacification in cataracts. It does not clear the opacity already there.

I have patients who are able to read the daily paper as well today as they did 10 or 15 years ago when they started treatments.

INSTRUMENTS

Cannulas.—Special small size malleable cannulas are essential for the proper technic of sinus lavage. The only cannulas of this type I know of on the market are under my name. Malleability of the cannula is absolutely essential, particularly in the technic of introducing the cannula through the frontonasal duct into the frontal sinus.

Adenotome.—As a rule, removal of adenoids is incomplete, and I believe this to be because of the imperfect instrument universally used for their removal and not because of poor technic on the part of the operator. The La Force adenotome is inadequate to remove adenoids properly in a large percentage of cases. The Cullom adenotome is, on the other hand, constructed to follow the contours of the postnasal space and to assure complete removal of the adenoid tissue. This adenotome was fashioned out of the old-fashioned curet which had a sharp blade for cutting downward from the top of the mass near the nasal septum. Introduced into this was a plunger activating a lower blade similar to that of the La Force adenotome. This blade is not for the purpose of cutting, but for holding the lower portion of the mass so that the curet blade can finish the incision without stripping the mucous membrane from the posterior pharyngeal wall. This instrument properly used is safe and gives a complete removal.

Tonsil Dissection Equipment.—In tonsil dissection it is highly desirable to use palate retraction as this tightens the mucous membrane over the tonsil, and, in order that the tissue is not compressed and wrinkled, a hook should be used in the center of the tonsil for retraction and to produce a tensing of the mucous membrane over the anterior and upper portions. With this retraction it is possible to penetrate the mucous membrane with the Goodfellow tonsil dissector, which has a blunt tip and sharp edges and is slightly curved on the flat. After breaking through the mucous membrane this blunt tip does not easily penetrate the capsule of

the tonsil but follows between the membrane and the capsule and severs the membrane where it is attached to the face of the tonsil. Further stripping of the tissue from the capsule is easily accomplished with this dissector. Whether it is completed by the dissector or a cold wire snare is immaterial. The most important area of the dissection is in the posterior aspect of the tonsils where the muscles are closely attached to the capsule. Here it is desirable that muscles be carefully removed from the capsule so that they will not be overlapped by the snare and thus cause bleeding and deformity of the palate. Any instrument which does not compress the tissues, such as Tyding's tenaculum, can be used for palate retraction. With a retractor and the tonsil dissector a clean dissection is possible.

FOOT PEDALS

Foot pedals on washbowl and electric light are indispensable to the maintenance of asepsis. A switch which will enable the physician to flash his light on and off without contaminating his fingers costs only a few cents. I use an ordinary automobile headlight dimmer switch (cost about 50 cents) mounted on a wooden block on my office floor. It has not needed any attention for many years.

IRRIGATING EQUIPMENT

The ordinary hand syringe for sinus irrigation should be relegated to the horse and buggy era where it belongs. The air pressure gauge on a modern specialist's unit or dental unit is an efficient mechanism for controlling the air which goes through a tube to the top of a bottle in the dental warmer and provides the force for irrigation. An old Tycos blood pressure gauge inserted into the air line gives a visual reading of pressure. This apparatus warns of high pressure and permits both hands to be free. An outflow tube which can be adjusted ½ inch or so into the fluid in the bottle determines the amount of fluid for each irrigation. To obtain more fluid the tube is slipped deeper into the bottle. The warmer maintains proper temperature.

CONCLUSION

This has been a hodgepodge of many subjects, and it is presented in the hope that it will be provocative as well as instructive. Little has been said about the newer therapies such as the antibiotics largely because in chronic conditions they have a very minor place. It is desirable, if they are to be used, that sensitivity tests be made so that time and money will not be wasted. If it can be proved that a certain antibiotic does control the growth of the organisms considered causative, that antibiotic is defintely indicated. To give an antibiotic without such tests is to waste the patient's time and money, and the doctor's reputation will suffer.

Too much emphasis cannot be placed on the desirability of a rhinologist having restoration of normal contours as an objective for any nasal surgery which he proposes. If nasal surgery is designed to restore normal space and normal contours of the turbinate bones and nasal septum, good results will follow.

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Tracheotomy

Its Indications, Technic, and Care

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There are two types of tracheotomy, the orderly tracheotomy which is always indicated whenever obstructive laryngeal dyspnea presents itself and the emergency tracheotomy for saving the life of a patient asphyxiating from laryngeal obstruction.

Early performance of orderly tracheotomy eliminates the later need of an emergency tracheotomy. If dyspnea has a sudden onset from trauma, foreign bodies in the larynx, or the rapid fulminating edema of acute infection of the larynx, emergency tracheotomy must be performed.

Third, the passing of a bronchoscope or Mosher lifesaver tube through the larynx into the trachea will give an airway which eliminates the danger of asphyxiation, and the tracheotomy may be performed more leisurely or in an orderly fashion.

The indication for tracheotomy, obstructive laryngeal dyspnea, has the following symptoms which are listed in their order of appearance:[1] (1) indrawing (a) at the suprasternal notch, (b) around the clavicles, (c) of intercostal spaces, (d) at the epigastrium; (2) restlessness; (3) choking and waking upon falling asleep; (4) ashy color; and (5) cyanosis (a very late symptom).

It must be stressed that if dyspnea is allowed to continue too long, the higher centers of the brain will be damaged and the respiratory centers fatigued with prolonged overstimulation, and the patient will become drowsy and die in his sleep.

For this reason postponement of tracheotomy may be regretted and can be justified only when the patient is under constant observation and a competent tracheotomist is promptly available.[1]

Any condition which may interfere with the laryngeal airway may require tracheotomy, which should be anticipated and planned and prepared for as early as possible. Some of the conditions which may interfere with the laryngeal airway and produce obstructive laryngeal dyspnea are as follows:

1. Those of infectious origin—diphtheria and postdiphtheritic stenosis; edema of the larynx associated with acute streptococcic infection of the nose and throat; stenosis due to perichondritis and abscess of the laryngeal structures or retropharyngeal abscess, syphilis, or tuberculosis; secretory tracheobronchial obstruction associated with tetanus, botulism, or poliomyelitis
2. Those of traumatic origin, including chemical and thermal factors—acute blockage, strangling, or choking producing fracture; foreign bodies; edema following instrumentation, inhalation of gases, fumes, or ingestion of corrosives; stenotic conditions from burning, cauterization, and surgery resulting in cicatrix.
3. Those of neurologic origin—secretory tracheobronchial obstruction from pooling or secretions after brain injuries, cerebrovascular accidents, neurosurgical procedures, or poliomyelitis; paralysis of the adductors due to bulbar disease, thyroidectomy, or tumors.
4. Tumors—benign such as juvenile papilloma, multiple papilloma, tumors of the tongue, tonsils, esophagus, and thyroid; malignant, intrinsic and extrinsic carcinoma.
5. Miscellaneous—eclampsia; hemorrhage, uncon-

trolled or uncontrollable, from pharynx or base of tongue; cysts; laryngismus stridulus; laryngeal webs; stenotic cicatrix from previous high tracheotomy.

Two recent cases in which tracheotomy was performed at the Osteopathic Hospital of Philadelphia are examples of how lives are saved by tracheotomy.

1. A patient recovering from cardiac arrest developed weakness of the laryngeal muscles and pooling of secretion in the throat as a result of temporary anoxia of the higher centers. The patient demonstrated signs of vegetation. His condition improved after tracheotomy was performed and an adequate airway was provided.

2. A two-year-old was admitted for the removal of a foreign body in the tracheobronchial tree. He had choked on peanuts and an anxious, well-meaning relative attempted to remove them from the child's mouth and throat with his finger. Some of the peanuts were forced into the tracheobronchial tree and traumatized the larynx. Following removal of the peanuts under bronchoscopic guidance, tracheotomy was done to relieve the obstructive laryngeal dyspnea.

I have seen two patients with bulbar poliomyelitis in which there was excessive pooling of secretion who were helped by prophylactic tracheotomy.

At the Osteopathic Hospitals of Philadelphia in any case of poliomyelitis it is routine to obtain permission in advance for tracheotomy. Tracheotomy may be needed to ease the load of a seriously ill patient using his accessory muscles when the diaphragm has been weakened, or vice versa, or even when distress is noted if the patient is in a respirator. The bulbar cases have great pooling of secretion and regurgitation from the esophagus with danger of drowning the patient. Tracheotomy is prophylactic when adequate trained personnel is not available to watch these cases.

In traumatic, thermal, or chemical injuries of the larynx and/or its lining mucosa which cause obstructive laryngeal dyspnea, the onset of dyspnea may be slow or rapid, and the necessity for tracheotomy must constantly be considered. Clear rapid reasoning and performing tracheotomy before the patient asphyxiates can be lifesaving, and if the process leading to such asphyxiation is slow moving, much anxiety and danger can be removed by anticipating the need and performing tracheotomy unhurriedly.

Tracheotomy is indicated in all conditions in which physiologic rest tends to reduce the activity of a morbid process.[2] Tracheotomy to improve a physiologic airway has no contraindications.

The technic of tracheotomy is well described in many texts. A few leading ones are those of Jackson and Jackson,[1] Lederer,[2] and Portmann.[3]

At the Philadelphia College of Osteopathy and its hospitals the technics described by Jackson and Jackson are taught and used.

Chevalier Jackson's tracheotomic triangle, or Jackson's safety triangle, is a figurative triangle of the gross anatomy of the neck having for its base a horizontal line at the level of the thyroid notch, its apex the suprasternal notch, and the sides or legs the sternocleidomastoid muscles. A line bisecting this triangle falls in the midline of the anterior surface of the neck and indicates the axis of the trachea and a safe line of incision for tracheotomy. Its safety lies in the fact that normally no major vessels or nerves cross this line.

This triangle should be studied and remembered for its great value in orientation in event tracheotomy is necessary.

When a tracheotomy is decided upon the operator must see that the patient is positioned properly. The patient, whenever practical, is placed in a supine position and the neck is extended by placing a cushion, sandbag, or pillow under the shoulders or upper dorsal area. Occasionally this position causes further respiratory embarrassment, and the patient may have to be elevated to a sitting position to maintain respirations. It is always desirable to have an assistant steady the patient's head. In an emergency, the operator's thigh may be used for a support.

A bronchoscope or rigid tube of the Mosher lifesaver type or even the flexible type used for tracheal intubation anesthesia is of great benefit in supplying a temporary airway and giving rigidity to the trachea. These are often not available when seconds count if an emergency has not been anticipated.

When the emergency tracheotomy presents itself it is helpful to have available a full complement of hemostats, retractors, tracheotomy tubes, and a Trousseau dilator. However, since assistants and a full complement of instruments are not always available, a review of the fundamental two-incision technic recommended by Jackson and Jackson would be helpful.

The operator, assuming he is right-handed, places himself at the patient's right and positions the patient as above described. The larynx and trachea are steadied with the thumb and middle finger of the left hand by gently but firmly pressing downward and laterally. This pulls the skin taut and presses the nerves and vessels under the protective cover of the sternocleidomastoid muscles.

The first incision is made in the midline on the longitudinal axis through the skin and superficial fascia down to the trachea. The incision is from the thyroid notch to just above the sternal notch. Care is exerted to avoid cutting the thyroid and cricoid cartilages because of the danger of perichondritis and necrosis, especially since this is not an aseptic technic as it would be in the orderly tracheotomy. This incisional wound is explored with the free index finger of the left hand to locate and count the tracheal rings. This is necessary as the wound is probably welling with blood. The second and third tracheal rings are identified and incised with the index finger acting as a guide. Care is exercised to avoid puncture of the posterior tracheal wall and violation of the esophagus. The patient is then rolled on his side to drain the blood from the wound. If the Trousseau dilator is available it is inserted into the tracheotomy wound and spread. If it is not available, the handle of the scalpel or the blade of the knife may be rotated to spread the tracheal incision apart for the insertion of the tracheal cannula. When a cannula is not available hairpins or pieces of wire must be fashioned to act as retractors to keep the airway open. These are anchored around the neck with a string, shoelaces, or rubber bands if necessary.

After the trachea is opened the patient will take a deep inspiration and cough out blood and secretions. After this occurs the bleeding slows somewhat and attention is given to hemostasis. This is necessary to reduce the stimulation of the cough reflex brought about by blood seeping into the trachea.

With the orderly tracheotomy, time is allowed for infiltration of the skin with a local anesthetic along the site of incision. Preparation is made in the usual manner for operating with aseptic technic by cleansing the skin of the neck from the chin above to

below the sternal notch. The line of the incision may be marked on the skin beforehand to assist in staying in the midline. Suction apparatus for aspirating the trachea can be in readiness. The incision is made much the same as for the emergency operation in that at first it includes only the skin and superficial fascia. Care is used to avoid damage to the thyroid and cricoid cartilages. The ribbon muscles are identified, separated in the midline by blunt dissection, and retracted out of the way. The work is done at a more leisurely pace, and the wound is kept dry by clamping, crushing, or tying any bleeding points as they present themselves.

The pretracheal fascia is incised over the trachea, and the isthmus of the thyroid at the usual level of the third or fourth tracheal ring is identified. This should be exposed by dissecting from above downward.

There are diverse technics of tracheotomy but the consensus is that the lower the incision is in the trachea, the better it is for the patient. By the same token, the lower the incision, the more difficulties are encountered by the surgeon, for the trachea dips deeper into the neck, and it is not uncommon to find pleura bulging up into the lower part of the dissection in young children and a baffling amount of areolar tissue present in those individuals with short thick necks. This makes it necessary to allow sufficient exposure, but the incision should be started high and the trachea incised as low as reasonable under the circumstances.

Incisions of the cricoid cartilage are not desirable, and the first tracheal ring is still too close to the cricoid and invites stenosis of the larynx and trachea as a result of cicatrix, which is a complication not welcomed later by the patient or by the surgeon.

Suprasternal tracheotomies are usually reserved for patients with stenotic lesions higher in the trachea from previous tracheotomy.

Most authorities agree that an incision from the second to the fifth tracheal ring is safe. The usual length includes two or three rings at least. The only difficulty is the general location of the thyroid isthmus at the level of the third or fourth tracheal ring. It is recommended that the isthmus be pushed upward or downward before incising the trachea and its position noted in event it obstructs the wound at a later time when changing cannulas. If it is not easily displaced to give adequate clearance, it is then recommended that it be severed between clamps or ties, thus getting it out of the way and allowing for better tracheal exposure.

When the trachea is exposed it is advantageous to elevate it and fix it with a hook or tenaculum at the level of the first ring. As in the emergency tracheotomy, care is taken to avoid damage to the perichondrium as this can lead to infection and necrosis.

The tracheal incision may be made at the level of the third or fourth ring and enlarged to include the second and/or fifth rings. The rings must be palpated before incising to be sure of position.

A displacement of the trachea from its usual position in the midline owing to torsion of the head or neck because of scar from previous surgery can cause an unwary operator rapidly to bypass the trachea, especially when he is under the stress of handling a failing patient, and make a fatal mistake of opening the esophagus which protrudes beyond the sides of the trachea posteriorly.

Another precaution to observe on entering the trachea is that the scalpel does not penetrate the posterior wall of the trachea and enter the esophagus with fatal complications. This is avoided by guarding the depth of the incision with the finger and making at first a small puncture which may be enlarged with a curved bistoury knife. In small children extreme care must be exercised as the posterior wall is soft, and the pressure applied by the incising knife can be sufficient to cause the esophagus to mushroom into the tracheal lumen.

Lateral dissection is to be avoided as it makes pockets for possible septic secretions and opens planes for extension of possible infection into the mediastinum. Every effort must be exercised to keep the incision in the midline.

Even though the tracheotomy incision is made, it is not sufficient to satisfy the ventilation needs and must be immediately spread for the intake of air. This is accomplished best with a Trousseau dilator designed for this specific purpose. Other types of forceps or curved clamps may be substituted or the rotated handle of a scalpel can spread the tracheotomy if a dilator is not available. This opening is necessary at first to allow the admittance of the cannula.

The tracheotomy tube or outer cannula with its obturator plug in place is introduced into the tracheotomy. The obturator is quickly removed if it is not coughed out, and the trachea is aspirated of any blood, clots, or mucus that may be present. This is done with a soft rubber catheter attached to the suction apparatus.

A restless and apprehensive patient will often fall asleep after these procedures are completed.

The inner cannula is placed in the outer cannula, and the anchoring tapes are loosely tied or fixed about the neck so that a dressing may be applied.

Some surgeons have described a technic of clipping away the cut ends of the tracheal rings to make a rounded opening, but this would later interfere with closure of the stoma. This technic is not followed at the Osteopathic Hospitals of Philadelphia.

Sutures or clips may be used at the upper end of the incision, but my practice is never to use them too close above the cannula and never below. The reason is that a pocket may be formed to catch secretions which can cause infection and resultant complications. The area will fill in rapidly by granulation if it is left open to drain and is redressed frequently.

The outer cannula must be changed and cleaned after the first 6 hours and once daily thereafter; this should be done by the surgeon or an experienced designate. The Trousseau dilator is held in readiness in case the stoma tends to close; it is used to reintroduce the outer cannula.

Suction apparatus should be available and care taken to keep the tubes open and clean for quick and efficient aspiration of the trachea.

The inner cannula should be cleaned as often as necessary, at least every half-hour, to insure a proper airway at all times. A special nurse who has been trained to insure this proper toilet should be on duty day and night. Extra cannulas are necessary to facilitate rapid changes when the cannulas are cleaned. The cannulas should have interchangeable parts fitted for use on the particular case. The size of the cannulas is determined at or prior to actual tracheotomy.

No narcotics should be given since they depress the guarding cough reflex. Proper humidity of the

air in the patient's room is essential to prevent irritation of the tracheobronchial tree which no longer receives air which has been conditioned by the nose. The after-care in tracheotomy is extremely important and requires great vigilance to maintain an adequate airway and to keep the cannulas free from crusts, clots, and mucus plugs.

One common complication which may at first be disturbing is the development of a subcutaneous emphysema with crepitus extending from the neck down over the chest and sometimes onto the abdomen. This usually is noticed after the first day but starts to subside within a week without specific treatment. Too small an outer cannula may be a predisposing cause.

Once the tracheotomy airway is established, even if respirations have ceased, oxygen and carbon dioxide mixture can be administered into the tracheobronchial tree and artificial respirations given to resuscitate the patient.

After the cause of obstructive laryngeal dyspnea is removed and decannulation is to be attempted, a small cork or plug, approximately one-fourth the area of the lumen of the cannular airway, is plugged into the external orifice of the inner cannula. This is known as a one-quarter cork, and if its presence is tolerated and does not cause the patient any distress it is left in for a day and a night. If the patient rests well enough through the night, the next day a larger cork is used to reduce the lumen further. This should remain in place all day and night. The size of the cork is increased until a full cork is used; if the patient can tolerate this for 2 days and 2 nights, he is ready for decannulation.

If, on the other hand, the patient becomes distressed with the cork in place, it is removed and the next smaller size is used for a day. Following this a larger cork again is used, until he can tolerate the full cork for 2 days and 2 nights. If the cork can be tolerated for 48 hours it is reasonably certain that decannulation and spontaneous closure of the stoma will not cause respiratory embarrassment. The stoma usually tends to close spontaneously by granulation. If this is delayed it may be shallowly dissected and closed with sutures. Later the scar may be removed by plastic surgery.

SUMMARY AND CONCLUSIONS

The technic of tracheotomy, its indications, what it accomplishes, and its care should be reviewed periodically. It is a lifesaving operation for which there is no substitute, and its success depends on the surgeon's skill and judgment. Otolaryngologists should develop adeptness in handling such cases.

A review has been given of the types of tracheotomy and their indications. The causes of obstructive laryngeal dyspnea have been outlined. A review of the technic of emergency tracheotomy and of orderly tracheotomy and a discussion of after-care and nursing care have been given.

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Anesthetic Accidents Related to Ophthalmology and Otorhinolaryngology

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Cardiac hypoxia is the primary cause of all anesthetic fatalities and is brought about by an interruption in the oxygen system of the body either through failure of the respiratory or circulatory system. Prevention of such accidents and recognition and management of the mechanisms contributing to this breakdown comprise the major concern of the anesthesiologist. Early recognition and correction limit the severity of the accident and avoid progression to the point of irreversibility.

Central failure of respiration may be produced by direct depression of the respiratory center through overdosage of premedication or depressant dosage of anesthetic agents.[1] Other types of respiratory failure involve the failure of supply and transportation.

Obstructions of the upper airway by breath holding; laryngeal spasm; obstruction of the soft tissues of the mouth; extrinsic hypertrophies or other lesions; and aspiration of gastric contests, secretions, blood, teeth, sponges, or removable parts of instruments are frequent causes of failure in oxygenation.

Lower airway obstruction occurs when mucous secretions develop in such quantities as to block the diffusion of gaseous agents and/or oxygen through the alveolar membranes. Atelectasis reduces the areal diffusion and may lead to failure of respiration; aspiration of foreign substances may act similarly.

Transportation failure applied to failure of respiration exists when hemoglobin is below reasonable limits, and the capacity of the circulation to carry oxygen is reduced. Slowing of circulation encountered in hypotension, hemorrhage, or prolonged carbon dioxide retention will cause failure of oxygen delivery even though the pulmonary concentration is high. These conditions constitute hypoxic hypoxemia, anemic hypoxemia, and stagnant hypoxemia.[1]

Circulatory failure contributing to cardiac hypoxia is associated with:

1. Hypotension—as in shock, either with or without hemorrhage, or the effects of particular agents, especially local agents. Actually, complications of hypotension relate to cardiac oxygen want.

2. Hypertension contributes to circulatory failure by disruption of a blood vessel or cardiac dilatation.

3. The third and most perplexing problem associated with failing circulation is that dealing with reflexes of the autonomic nervous system, in which the end results are ventricular fibrillation or ventricular standstill.

4. Emboli of air, vegetation, or fat are causes of circulatory failure.

These factors, in varying degrees, are responsible for the majority of anesthetic accidents. Their re-

versible stages offer the best opportunity for correction.

From the foregoing discussion, it is evident that anesthetic accidents in the fields of ophthalmology and otorhinolaryngology do not differ in kind from anesthetic accidents in other fields of surgery. However, there are certain considerations which may magnify these accidents when they do occur and also hazards which are peculiar to this field.

Little can be said to minimize the impact of a fatal accident which occurs during an elective operation on a patient ostensibly in good health, and even less when the patient is a child. The majority of operations on the eye, ear, nose, and throat are performed on patients in good health and on children.

Operations on the head and neck provide certain hazards which are contributory to the incidence of accidents not common to surgery of other parts of the body.

Foremost of these hazards is airway obstruction. It is frequently necessary to obscure the patient from the view of the anesthetist. He must vacate his normal station to provide the operator with access to the surgical field. This minimizes his tactile sense in evaluating the condition of the patient. Drapes reduce his view of the patient and, in addition, muffle respiratory sounds. Control of the airway is difficult under these conditions, and frequently carbon dioxide is inadequately dispelled from the patient huddled under drapes, and the complications of carbon dioxide retention result.

Pathologic conditions of the oropharynx and larynx by mere existence may jeopardize the airway by distortion or by drainage. During operations in this area the open airway may be disturbed by obstructions from instruments, displacement of soft tissues against the posterior pharynx, and surgical debris (blood, clots, tissue fragments, and sponges).

During tonsillectomies, in order to maintain an open airway, the assistant may be assigned management of the tongue depressor. Each case seems to reveal some new means whereby this impossible chore provides obstruction. The assistant maneuvers to provide himself with a good view of the field. That the surgeon cannot see is secondary, and that the patient cannot breathe is immaterial.

Maintaining an open airway is a team responsibility. The depth of anesthesia required to facilitate operation is a problem of surgery belonging to the anesthetist. Relaxation of the adjacent musculature necessitates moderately deep anesthesia which may cause depression if maintained for long periods. Obliteration of reflexes of the area creates a similar problem.

Inasmuch as 99 per cent of anesthetic deaths are due to some interference with respiratory and circulatory efficiency which causes oxygen deficiency, and the most common cause is ineffective respiration,[2] it becomes second nature for the surgeon to be aware of threats to the integrity of the airway. My early experience with intubation technics of anesthesia caused concern on the part of more than one operator when the sounds of respiration were not audible while operations were being performed.

I feel that the divided responsibility for maintaining an airway, with possible neglect on the part of the surgeon or assistant and inaccessibility of the anesthetist, has been a large factor in the widespread usage of intubation anesthesia.

The use of secondary agents, especially epinephrine for the control of hemorrhage in small cavities, is frequent in nasal and oral surgery, and a reasonable procedure from the surgical standpoint. However, epinephrine is a stimulant and has been accused, and justly, of initiating ventricular fibrillation.[1]

Many procedures in ophthalmologic and otorhinolaryngeal surgery are short in duration and are considered minor procedures. The patient enters the hospital shortly prior to operating time, and possibly has had breakfast. Premedication is hastily given, probably to exhibit its maximum effect concomitantly with well-established surgical anesthesia. Laboratory reports are not completed or are unavailable.

There is no anesthetic procedure that can correctly be classified as minor. I do not intend to imply that anesthesia is the most important practice in the field of surgery, but there are few chances for second opportunities.

It is my practice whenever possible to examine the pediatric patient a few days prior to surgery, evaluate his physical condition, and prepare him for the procedures of the hospital, including the tools of the anesthesia which he will see, and possible reactions to anesthesia. Usually this has proved far more satisfactory than heavy premedication. In a field involving such a high percentage of pediatric patients, the hazards of children prevail. Considering anesthetic procedures as trivialities courts disaster, in that vigilance is too frequently relaxed.

Many patients tend to be hypersensitive and can be expected to present so-called idiosyncrasies. Recently a 54-year-old Spanish woman was presented for anesthesia for the removal of a nasal polyp. It was reported that previous attempts to remove it, using both cocaine and Pontocaine topically, were unsuccessful. Premedication of Demerol and atropine was administered with adequate effect. Pentothal sodium, 0.2 grams, was administered intravenously, and nitrous oxide-oxygen anesthesia was instituted preparatory to intubation. Effortful respiration without exchange was noted after initial infusion of succinyl choline chloride, 0.1 per cent. No impairment of the upper airways was found and, upon laryngoscopy, the vocal cords were observed in complete abduction, yet no air exchange occurred. Intubation was completed, and controlled positive pressure ventilation was continued for 4 minutes before spontaneous respiration resumed. This is the only case of bronchospasm observed in over 900 cases under the procedure as outlined.

In general it may be found that certain accidents are prone to occur with the use of particular anesthetic agents and a brief reference to these follows:

LOCAL AGENTS

Much has been written about idiosyncrasies to local anesthetics. I do not deny that these exist, but intelligent evaluation of accidents encountered with local agents will eliminate any frequency. All of these agents are toxic, differing only in degree.[3]

Immediate reactions result from rapid absorption in a brief time and are charactertized by circulatory collapse, respiratory failure, and death in a few minutes. The more common reaction occurs within about 15 minutes, is initiated by somnolence progressing to coma, and is associated with hypotension, pallor, diaphoresis, muscular twitching, or convulsions. Active treatment should be directed to the relief of hypotension with vasopressor substances; the resultant hypoxia should be combated with 100 per cent oxygen and the convulsions with soluble intravenous barbiturates.

Selection of local agents should be based on the following considerations: (1) the least toxic agent, (2) the lowest concentration, and (3) the lowest total amount.

Epinephrine, used commonly with local agents to potentiate their action, is effective by delaying absorption and acts as a protection against the reactions which accompany rapid absorption. However, it should be remembered that undesirable reactions do occur. They range from initial ischemia, with secondary vasodilatation possibly leading to latent postoperative hemorrhage; to hypertension, a hazard to the hypertensive patient; and to the rare production of ventricular fibrillation which is most likely to occur when epinephrine is used with cocaine.

INHALATION AGENTS

There has been too much unwarranted condemnation of inhalation agents singularly and collectively. It is my contention that in the majority accidents occur from their misuse rather than their use.

Accidents may be anticipated when inhalation agents are employed and are most prone to occur during the periods of induction and recovery when reflexes are active. Undoubtedly the number of serious accidents is greater during recovery, particularly when the patient has been returned to the ward following operation and his care entrusted to personnel less familiar with the attendant complications and their treatment than are physicians.

Incompatibility of the plane of anesthesia and the surgical stimulation provoke the complications of regurgitation, laryngeal spasm, and reflex obstruction of the airway.

Depression and its accidents are encountered in inhalation anesthesia owing to failure of the anesthetist to appreciate the limitations of particular agents. Nitrous oxide administration can be used as an example: In safe concentration nitrous oxide is an excellent analgesic, but it is extremely important to maintain that safe concentration while muscular relaxation is being attained. The admonishments of the surgeon provoke the neophyte anesthetist to increase the concentration, at the expense of safe oxygen levels for the patient, in an attempt to produce conditions for operation.

Deliberate induction, compatible with the time necessary for proper saturation, will obviate accidents which involve the airway and also the reflexes. There are few short cuts in induction of anesthesia which do not reflect instability throughout its entire duration.

Cyclopropane, chloroform, and ethyl chloride possess cardioirritant effects, which, in my opinion, at least with cyclopropane and ethyl chloride, are particularly related to the carbon dioxide retention existing at the time. I do not know if this is true of chloroform, having employed this agent only twice.

Safeguards in the employment of inhalation anesthesia include a thorough appreciation of the limitations of the agent employed, thorough familiarity with the signs of depth of anesthesia, and full technical ability to maintain an airway by whatever means required, including endotracheal intubation and bronchoscopy. Laryngeal spasm is a condition which, I feel, should be respected rather than feared. Management of this condition may include four procedures which are, in order of choice: (1) forced ventilation with oxygen since pressure from above will frequently separate the cords, (2) intravenous atropine with its autonomic effect, (3) deepening of the anesthesia to a plane wherein relaxation will occur, and (4) use of one of the curariform agents.

Further safeguards are aspiration of debris, avoidance of mechanical obstructions by a careful check of instruments, careful use of sponges, protection of deciduous or false teeth, and careful induction and competent postanesthetic attention.

INTRAVENOUS ANESTHESIA

Intravenous barbiturate anesthesia in surgery of the head and neck offers a comfortable, pleasant induction and myriad hazards and/or complications, either actual or potential, to the extent that I feel strongly that it should be reserved for induction and for brief operations on the eye or ear.

Tonsillectomies have been observed for which the sole anesthetic agent employed was Pentothal, even without oxygen. Reductions of malar fractures have also been observed in which only Pentothal was used and remarkably little concern was demonstrated over the fact that the patient's color blended favorably with the areal ecchymosis of the original trauma.

CARDIAC EFFECTS

Current public attention to cardiac arrest provokes especial consideration of this particular accident. Cardiac arrest is the end result of myocardial anoxia or vagal reflexes, manifested as either ventricular fibrillation or ventricular standstill. Ventricular fibrillation comprises 10 per cent of the cases of cardiac arrest and is usually fatal.

The cause of myocardial anoxia has already been discussed. Vagal reflexes are due to direct surgical stimulation through traction of visceral areas and anesthetic stimulation as in endotracheal intubation or extubation. Sudden strong vapors when the air passages are open produce stimulation of the vagal receptors in the lung. Rapid forced induction in an improperly prepared patient, initiation of the surgical procedure in an improperly anesthetized patient, air embolism, and endogenous or exogenous epinephrine in conjunction with cyclopropane anesthesia comprise the remaining causes.

The effects of anesthetics on the heart are threefold: (1) toxic effects on the myocardium, (2) interference with the pacemaker and rhythm, (3) peripheral impairment with diminished volume return to the heart.

Intelligent treatment of cardiac arrest comprises recognition of the threat and destroying that threat before the actual condition arises.

Foremost in treatment is that of arrhythmias. All arrhythmias are due to overactivity of the autonomic nervous system and not to any toxic effect on the myocardium. In deep Pentothal, trichlorethylene, vinyl ether anesthesia, and, to a lesser degree, in ethyl ether as well as cyclopropane anesthesia without absorption of carbon dioxide, the carbon dioxide retention results in ventricular arrhythmias which precede ventricular fibrillation. Release of carbon dioxide should be insured, and epinephrine should be avoided. It is possible to anesthetize with any agent and maintain normal rhythm.[4] Therefore, the anesthetist must be aware of the management of arrhythmias.

Bradycardias develop progressively as a result of reflex mechanisms and should warn of impending arrest. Atropine or atropine-like drugs are paramount in the correction of these arrhythmias.

Cardiac arrest may occur at any time during any operation, major or minor, and under any anesthetic, local or general. It is characterized by a gray color,

dilated pupils, imperceptible pulse and blood pressure, and sighing respiration that soon ceases. The condition should be recognized by the anesthetist; if the surgeon is the first to recognize the condition, in the absence of an open thorax, the most valuable element, time, has undoubtedly been jeopardized.

Treatment is aimed not at the heart but at the brain. Trendelenburg position places the brain lower than the heart. Administration of oxygen, by rhythmic inflation and rhythmic compression of the heart to supply the brain, is the primary treatment. Dextrose or blood to maintain the circulatory volume and other medications are secondary treatment.

Medications to be used are:

1. Epinephrine, 0.5 to 2 cc., in a solution of 1:5,000, should be injected into the auricle in the presence of regular weak contractions, not when ventricular fibrillation exists. Epinephrine directly affects the myocardium and the conductive system.

2. Calcium chloride, 2 to 4 cc. of 10 per cent solution, should be injected into the left ventricle under the preceding conditions when epinephrine is ineffective.

3. Procaine, 10 cc. of 10 per cent solution, should be injected into the auricle or 50 to 100 cc. of 1 per cent solution should be injected intravenously when ventricular fibrillation exists and does not respond to electroshock. Procaine diminishes myocardial irritability.

4. Procaine amide, 100 to 200 mg., should be administered intravenously. Its action is the same as procaine. The actual value of this agent is debatable.

5. Atropine sulfate, 1/100 grain, should be given intravenously in arrest due to vagal reflexes, but is contraindicated in tachycardia.

6. Quinine, 0.2 grams four times a day, should be given preoperatively in the presence of arrhythmias.

The central nervous system stimulants, Coramine, Metrazol, caffeine, ephedrine, Neosynephrine, and the like, which are frequently employed as emergency measures, by virtue of their action seem to be illogical medications in the presence of cardiac arrest. These drugs increase the cerebral oxygen demand which is the already existing problem.

Digitalis derivatives retard auriculoventricular conduction and are to be avoided.

Although the following case was not in the field of ophthalmology or otorhinolaryngology, it is described because resuscitation was successful, and it emphasizes the principles discussed.

A 66-year-old male was brought to surgery for amputation of a gangrenous extremity. The underlying processes included lues and diabetes. Spinal anesthesia was induced with 12 mg. of Pontocaine, and the patient was placed supine. Within 5 minutes the blood pressure was not perceptible, and no pulse could be obtained. Oxygen was applied under positive pressure with a closed system and face mask. Within 2 minutes of the application of oxygen the thorax was entered and the heart was massaged. Spontaneous cardiac action resumed within 3 minutes of the massage. Endotracheal intubation was established during the thoracotomy. Spontaneous respiration and heart function returned within 5 to 6 minutes, and blood pressure was restored.

The surgical procedure was completed, and the patient returned to the ward 1 hour later. Owing to some disorientation of the patient prior to surgery and his inability to speak English, his condition caused marked concern for several days. Follow-up 4 months later revealed no evidences of residual damage.

CONCLUSION

Anesthetic accidents are best handled, least likely to occur, and less severe when the anesthesiologist is well trained, well experienced, and will evaluate his patient, properly premedicate him, and select the anesthesia best suited for him under the proposed circumstances.

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BOOK NOTICES

(Continued from page 474)

Gifford's Textbook of OPHTHALMOLOGY. By Francis Heed Adler, M.D., Professor of Ophthalmology, University of Pennsylvania Medical School; Consulting Surgeon, Wills Eye Hospital, Philadelphia. Ed. 5. Cloth. Pp. 488, with illustrations. Price $7.50. W. B. Saunders Company, West Washington Sq., Philadelphia, 1953.

The late Dr. Gifford envisioned a book on ophthalmology which could be used as a textbook for medical students as well as a reference book for the general practitioner. Now in its fifth edition, the second edition under Dr. Adler, this text attains its original purpose through numerous changes and additions.

Revisions were made in compliance with the results of research in medicine, observations and analyses from wide and continued use of the fourth edition in the classroom, and appraisal of its application in the field. Thus we find a well-written, authoritative, up-to-date manual on ophthalmology. It gives all the essential facts on the subject without becoming graduate material, it gives adequate information on treating a patient before a specialist is consulted, and it gives all the recent therapeutic agents used in the specialty. Emphasis has been laid upon relation of the eye to general medical problems, particularly those involved in neurologic conditions, hypertensive diseases, and diabetes; on the general indication for surgery rather than surgery of the eye; and on the use of the newer drugs in treating common disorders.

The general format of the book has been improved. It is well indexed and many of the 281 figures are new. There are twenty-six color plates.

EXPERIMENTAL HYPNOSIS. A Symposium of Articles on Research by Many of the World's Leading Authorities. Edited by Leslie M. LeCron. Cloth. Pp. 483. Price $6.00. The MacMillan Company, 60 Fifth Ave., New York, 1952.

An attempt to bring hypnotism out of the shadows of pretense and mysticism where it has lingered for over 170 years into the light of scientific inquiry is the stated purpose of this book.

Leading authorities throughout the world were requested to undertake experiments or to write about some particular

phase of hypnosis which needs clarification. The contributions were written in the usual form for scientific articles, but the contributors were asked to modify the usual technical language to some extent in order to make the book readily understandable by lay readers.

Deep trances and their induction; posthypnotic suggestion and autosuggestion; and practical applications of hypnotism in obstetrics, dentistry, psychotherapy, and in the further understanding of human behavior are discussed.

IMMUNITY, Hypersensitivity, Serology. By Sidney Raffel, Sc.D., M.D., Professor of Bacteriology, Department of Bacteriology and Experimental Pathology, Stanford University School of Medicine. Cloth. Pp. 531, with illustrations. Price $8.00. Appleton-Century-Crofts, Inc., 35 W. 32nd St., New York 1, 1953.

In any area of new emphasis in medicine the development of an adequate literature must await experience, experimentation, trial, and evaluation. The field of immunity is no exception. Although interest in this problem has been growing rapidly, only recently have there been adequate textbooks on the subject. For this reason the mechanisms and the relationships of immunity and of sensitization to the development of disease are not sufficiently familiar to the average physician. Here is a book by a well-known investigator in the field that gives a complete coverage of the immunity processes in general.

This work is an excellent introduction to the study of immunization and hypersensitive mechanisms as it gives a solid foundation, emphasizing immunology rather than hypersensitivity and its relationship to the pathogenesis of disease. It is the author's intention to describe the phenomena of immunity in basic terms, especially with regard to resistance to bacterias, viruses, and toxins. The four sections of the book are: Fundamental aspects of immunity, hypersensitivity, mechanisms of resistance in various infectious diseases, and serology and antigenic systems.

Technical in presentation it is thorough and exacting in developing the background of principles in the subject. Charts, diagrams, and well-chosen illustrations help in the presentation.

LIVING WITH A DISABILITY. By Howard A. Rusk, M.D., and Eugene J. Taylor in collaboration with Muriel Zimmerman, O.T.R., and Julia Judson, M.S. The Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center. Cloth. Pp. 207. Price $3.50. The Blakiston Company, Garden City, New York, 1953.

Essentially a picture book of various devices available for disabled persons this manual, the first of its kind, is a storehouse of ingenious aids for making the lives of the handicapped easier and happier for themselves and their families. The work grew out of two research projects, the Self-Help Device Research Project and the Disabled Homemakers' Research Fund.

The first project was made possible through a March of Dimes grant to the Institute of Physical Medicine and Rehabilitation of the New York University-Bellevue Medical Center. The study encompassed all devices that could be found by research in medical libraries; letters to hospitals, clinics, rehabilitation centers; U.S. Patent Office; et cetera. All ideas were clinically tested. When no device was available to meet a particular need, an attempt was made to design and develop such an aid.

The second project was made possible by a fund which was established by a number of the nation's leading public utility companies to learn more about the problems of more than 10,000,000 handicapped women. Experiments were conducted with equipment primarily suitable for specific disabilities.

The results of these projects are graphically treated with 282 photographs and line drawings each with descriptive captions. Not only aids for performing all vital functions are given, but also included are suggestions for layouts in the home. The text is simply written.

Physicians, nurses, social workers, and physical and occupational therapists as well as the handicapped and their families will be vitally interested in the manual. The source of each aid is given in a special index.

NUTRITIONAL STUDIES IN ADOLESCENT GIRLS AND THEIR RELATION TO TUBERCULOSIS. By Joseph A. Johnston, M.D., Pediatrician-in-Chief, Henry Ford Hospital and The Edsel B. Ford Institute for Medical Research, Detroit, Michigan. Cloth. Pp. 320. Price $7.50. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill., 1953.

Poor nutrition and tuberculosis are traditionally associated, but data giving clear proof of this relationship are difficult to obtain.

This report of a study of the effect of nutrition and metabolism on adolescent girls, most of whom had tuberculosis, attempts to show that the abrupt increase in the adult form of tuberculosis in adolescence is related to a failure to meet the nutritional requirements for growth peculiar to this period. It also shows that a favorable course of the disease process, once it has developed, may be conditioned to a large extent by the degree of success in promoting a normal nutritional state, replenishing previously acquired deficits.

The general physician, pediatrician, and nutritionist, as well as the chest specialist, will find this study a valuable contribution to their literature. The study will assist the practitioner in evaluating diets of adolescents and aid him, through the understanding of the mechanism of nitrogen utilization, to prevent as well as assist in the healing of active cases by dietary procedures.

THE ACTION OF INSULIN. By Niels Haugaard, Ph.D., Assistant Professor of Physiological Chemistry in Research Medicine, School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania, and Julian B. Marsh, M.D., Assistant Professor of Physiological Chemistry, Graduate School of Medicine, University of Pennsylvania, Philadelphia, Pennsylvania. Paper. Pp. 113. Price $3.75. Charles C Thomas, 301 E. Lawrence St., Springfield, Ill., 1953.

Although insulin was discovered more than 3 decades ago, the precise biochemical mode of its action still remains unknown. It is the twofold purpose of this monograph to point out (1) the present status of insulin action, and (2) the areas in which research is needed.

The authors trace the changing concepts of the metabolic action of insulin from its discovery to the present time. This includes the essentials of intermediary metabolism and the chemistry of the hormone and its physiological action. The influence of other hormones on the action of insulin is also outlined.

In so concise a book, the writing must be of a technical nature. Interested readers will be investigators and endocrinologists.

CLINICAL OBSTETRICS. By Members of the Staff of the Pennsylvania Hospital. Edited by Clifford B. Lull, M.D., Late Director, Division of Obstetrics and Gynecology, Pennsylvania Hospital, and Robert A. Kimbrough, M.D., Director of the Division of Obstetrics and Gynecology, Pennsylvania Hospital; Professor of Gynecology and Obstetrics, Graduate School of Medicine, University of Pennsylvania; Gynecologist to the Graduate Hospital. Cloth. Pp. 732, with illustrations. Price $10.00. J. B. Lippincott Co., East Washington Sq., Philadelphia 5, 1953.

The practice of obstetrics in the Pennsylvania Hospital is recorded in Clinical Obstetrics by twenty specialists who discuss various phases of the field. Ably edited to be a complete guide in obstetrics for students and an up-to-date reference for those in the field, the organization of subject matter is conducive to benefit each group. Emphasizing current practices and technics, an attempt is made to integrate all materials on one subject in a single chapter. Thus we find clinical tests applicable to both normal and abnormal pregnancy grouped together. Not only is the organization practical from

the usability aspect, but the subject matter of each chapter has been reduced to practical bases. Excellent diagrams are used to illustrate and clarify the various maneuvers necessary for successful accomplishment of births.

The trend in medical education is toward an increasing emphasis on contact with patients and also parent-education programs. An interesting chapter is the Outline of Obstetric Nursing Practice which gives a detailed outline of steps in caring for the patient during hospitalization and points to be covered in parent education.

The references are discriminating rather than exhaustive.

The members of the staff of the Pennsylvania Hospital can be justly proud of this complete guide to clinical obstetrics which is highly recommended as a "silent consultant."

THE PRINCIPLES OF NEUROLOGICAL SURGERY. By Loyal Davis, M.S., M.D., Ph.D., D.Sc., (Hon.), Professor of Surgery and Chairman of the Division of Surgery, Northwestern University Medical School, Chicago, Illinois. Ed. 4, revised. Cloth. Pp. 544, with illustrations. Price $8.50. Lea & Febiger, Washington Square, Philadelphia 6, 1953.

The pace of research in medicine has accelerated notably in the past quarter century and, as an outgrowth of the advancement in all facets of medicine, neurologic surgery has attained maturity as a surgical specialty. These medical and surgical findings, as well as the technical advances made by scientists in related fields, made revision of this text necessary. Contributions to the traumatic aspects of neurosurgery during World War II; the results of atomic research and its diagnostic aid to the solution of intracranial neurological problems; angiography and intracranial aneurysms; radioactive isotope tracer dye tests for localization of intracranial tumors; technics of ventriculography, electroencephalography; and other diagnostic methods are the most important additions made to this volume

The author, by successfully correlating these scientific and medical advances, has attained his aim of presenting diagnostic, symptomatologic, and pathologic technics in neurologic surgery, and thus contributes to the resources of the physician-readers to the end that they will be able to advise their patients concerning the early existence of neurologic and neurosurgical disease. The discussions of treatment stress indications and end results. This text is highly recommended as an authoritative sourcebook for those who wish to become familiar with the fundamentals of neurosurgery.

ESSENTIAL UROLOGY. By Fletcher H. Colby, M.D., Chief of the Urological Service, Massachusetts General Hospital; Associate Clinical Professor of Genito-Urinary Surgery, Harvard Medical School, Boston, Massachusetts; Urological Consultant, Lakeville State Sanatorium, Middleboro, Massachusetts. Ed. 2. Cloth. Pp. 650, with illustrations. Price $8.00. The Williams & Wilkins Company, Mt. Royal & Guilford Aves., Baltimore, 1953.

This concise and well-written volume has as its stated purpose "to give the important facts of the embryology, anatomy, physiology, and diseases of the genitourinary organs." Other purposes are to provide students, residents, urologists, and general practitioners with a general review of the subject and also to aid those preparing for an examination of the Board of Urology.

In order to accomplish what he sets out to do the author divides the subject matter into three parts: (1) embryology, anatomy, and physiology of the genitourinary organs; (2) examination of the urological patient; (3) diseases of the genitourinary organs. Throughout the text many photographs, photomicrographs, urograms, and anatomic drawings are used to clarify the material. Their use not only indicates the emphasis put on basic principles—particularly gross and microscopic pathology, physiology of kidney, and methods of examination—but the choice of materials indicates that the book is largely based on sound experimental and clinical evidence.

In order to bring this second edition up-to-date the chapters on diseases of the prostate, testis, and tuberculosis have been thoroughly revised; references have been added; and new photomicrographs replace certain of the former ones.

THORACIC SURGERY AND RELATED PATHOLOGY. By Gustaf E. Lindskog, B.S., M.A., M.D., F.A.C.S., William H. Carmalt, Professor of Surgery, Yale University School of Medicine; Surgeon-in-Chief University Service, Grace-New Haven Community Hospital, and Averill A. Liebow, B.S., M.D., Professor of Pathology, Yale University School of Medicine; Pathologist-in-Chief University Service, Grace-New Haven Community Hospital. Cloth. Pp. 644, with illustrations. Price $15.00. Appleton-Century-Crofts, Inc., 35 West 32nd St., New York 8, 1953.

The expressed purpose of the authors is to provide a compilation of available knowledge in the field of thoracic surgery, with particular attention to the basic aspects of anatomy, physiology, and pathology that are essential to the comprehension of this complex subject. This book is unusual in its emphasis on and illustration of pathology.

Thoracic surgery, which began to attract special interest only after World War I, has, in the ensuing 3 decades, become widely employed for a diversity of conditions. During that period interests have shifted to the extent that new texts are necessary to keep abreast of developments.

Much of this book has been devoted to the surgical treatment of tuberculosis and to discussion of the cardiac and vascular diseases susceptible to surgical correction or in which substantial surgical progress is being made. The uses of antibiotic agents are fully discussed, and their particular usefulness in reducing the incidence of such infectious lesions as abscess, empyema, and bronchiectasis are evaluated.

The book is filled with helpful suggestions for improved results in diagnosis and treatment. Surgical management and operative technic are presented as fully as is desirable in a volume of this size, but frequently the minutiae of operative technic have been omitted because of their accessibility in other standard works.

ANALGESIA AND ANESTHESIA IN OBSTETRICS. By J. P. Greenhill, M.D., Professor of Gynecology, Cook County Graduate School of Medicine; Attending Gynecologist, Cook County Hospital; Attending Obstetrician and Gynecologist, Michael Reese Hospital; Associate Staff, Chicago Lying-In Hospital, Chicago, Illinois. Cloth. Pp. 85, with illustrations. Price $2.75. Charles C Thomas, Publisher, 301-327 East Lawrence Ave., Springfield, Ill., 1952.

A careful reading of the eighty pages of this monograph will furnish to interested physicians—which should include all who carry on even a minimal obstetrical practice—fundamental knowledge of the agents used in obstetric analgesia and anesthesia. Packed into these pages is a half century's collective medical experience, directed to a near total of pain obliteration in childbirth. This experience has resulted in the employment of pain-relieving drugs to a degree unknown outside the United States and in hospital deliveries reaching 86 per cent of all live births. Pain relief has been highly successful but it has been accompanied by a significant number of natal, neonatal, and maternal deaths. Most of these deaths result from injudicious, or even unskilled, use of pain-relieving agents, and the practice of obstetrics in the United States cannot escape its accountability for the price paid in human life for the relief of pain. Upon that score alone the technic of Grantly Dick Read ("Natural Childbirth") demands much more consideration and study than has yet been given it by American doctors. Two and one-half pages of this text serve to introduce the technic.

It goes without saying that a selective application of the procedures outlined in this monograph by doctors universally conscious of the dangers involved in all procedures would result in a sharp decline of maternal deaths. High commendation goes to the publisher for making essential knowledge available at so slight a cost in time and money to the doctor. Unfortunately, riddance of self-satisfaction and inertia cannot be so rapidly accomplished.

THERAPEUTICS IN INTERNAL MEDICINE. Edited by Franklin A. Kyser, M.D., F.A.C.P., Assistant Professor of Medicine, Northwestern University Medical School, Chicago; Attending Physician, Evanston Hospital, Evanston, Illinois. Ed. 2, revised. Cloth. Pp. 830. Price $15.00. Paul B. Hoeber, Inc., 49 E. 33rd St., New York, 1953.

Basically a handbook, this one-volume reference book on therapeutics is a complete guide to the therapy used in all diseases classified under the specialty of internal medicine. Treatment of medical diseases has advanced so rapidly since the first edition was released in 1950 that it was necessary to completely revise that text in order to bring the material in the second edition up-to-date.

Seventeen new contributors were added to the original outstanding group of sixty-seven teachers, investigators, and administrators. Twelve new sections were added to the eighteen chapters which comprise the book. For the most part the chapters are arranged according to related internal disorders, although chapters on the following are exceptions: infectious, parasitic, and metabolic diseases; fluid and electrolyte balance; and symptomatic treatments. The therapy given is the conservative, generally accepted method and there is little discussion of controversial subjects. Clinical descriptions of diseases are not included unless such information is required for an understanding of the principles of therapy presented.

Features of this reference book which add to its usability are a well-chosen bibliography at the end of each section, an appendix which lists special dietotherapy, and a comprehensive index. The printing and binding are excellent and the text highly readable because of the double column format.

HUMAN NEUROANATOMY. By Oliver S. Strong, Late Professor of Neurology and Neurohistology, College of Physicians and Surgeons, Columbia University; and Adolph Elwyn, Associate Professor of Neuroanatomy, College of Physicians and Surgeons, Columbia University. Ed. 3. Cloth. Pp. 481, with illustrations. Price $7.50. The Williams & Wilkins Co., Mt. Royal & Guilford Aves., Baltimore 2, 1953.

Ten years ago the first edition of this book appeared in print and in that preface the authors stated, "Neurology, more perhaps than any other branch of medicine, is dependent on an accurate knowledge of anatomy as a basis for the intelligent diagnosis and localization of neural disturbance." In the years between editions there have been advances pertinent to the subject in the centers of research, and there have been suggestions for improving the format of the book from student users, instructors, and practitioners. To incorporate new material and new presentations has meant rewriting and expanding the text. New material includes that on nerve cells and nerve fibers including processes of degeneration and regeneration, cerebellum, thalamic nuclei and connections, subthalamus, reticular system of the brain stem, and prefrontal areas.

The authors have attempted to discuss structural mechanisms from the viewpoint of their physiologic and clinical signficance and to link structure and function into a dynamic pattern without sacrificing anatomic detail.

The bibliography contains many new references. The text is fully illustrated.

Holt PEDIATRICS. By L. Emmett Holt, Jr., Professor of Pediatrics, New York University College of Medicine; Director, Children's Medical Service, Bellevue Hospital, New York City, and Rustin McIntosh, Carpentier Professor of Pediatrics, Columbia University, and Director of the Pediatric Service in the Babies Hospital, New York City. Edition 12. Cloth. Pp. 1485, with illustrations. Price $15.00. Appleton-Century-Crofts, Inc., 35 West 32nd St., New York, 1953.

The previous eleven editions of this text have been too well known and too widely used for this twelfth one to require lengthy review. However, a new edition was made necessary by the amazing progress of medicine in the past decade, which is reflected in no single specialty to a greater extent than in pediatrics. Because of the scope of present-day pediatrics, the authors have not attempted to cover it themselves, but have enlisted the help of seventy-two authorities. The contributions of the collaborators have been unified in a manner which is a definite improvement over that usually resulting from multiple authorship.

The use of antibiotics, the extension of the field of chemotherapy and hormonal preparations, the development of cardiac surgery, and improvements in prophylactic and diagnostic measures have been incorporated in this edition which is, as was its predecessors, authoritative, clearly written, fully documented, and well balanced. It should satisfy the needs of both students and practicing physicians.

OFFICE ORTHOPEDICS. By Lewis Cozen, M.D., F.A.C.S., Attending Orthopedic Staff: The Orthopedic Hospital, Veterans' Hospital, Los Angeles County Hospital, Cedars of Lebanon Hospital, Los Angeles, and Los Angeles Tuberculosis Sanitarium, Monrovia, California; Assistant Professor of Orthopedic Surgery, College of Medical Evangelists, Los Angeles. Ed. 2. Cloth. Pp. 304, with illustrations. Price $5.50. Lea & Febiger, 600 S. Washington Sq., Philadelphia 6, 1953.

Although many procedures which general practitioners can and should use in the office treatment of orthopedic cases are described, this book is, as is pointed out in the preface, an auxiliary to a standard textbook on orthopedics. Although no one of the topics which fall under the general headings of technics, diagnosis and treatments, and various symptoms, is dealt with exhaustively, it provides in a manageable volume a great many practical suggestions and, in general, includes the basic principles applicable to ambulatory orthopedic patients. It has been revised to embrace up-to-date treatments and refers to new methods, drugs, and splinting materials.

Consistent with the title of the book, the author discusses a variety of material available, physical therapy technics, correction exercises, and treatments of orthopedic lesions applicable to office treatment.

Bibliographies have been revised and enlarged. The illustrations and drawings, for the most part borrowed from other texts, extend the word descriptions adequately.

STANDARD VALUES IN BLOOD being the first fascicle of a Handbook of Biological Data. Edited by Errett C. Albritton, A.B., M.D., Fry Professor of Physiology, The George Washington University. Prepared under the Direction of the Committee on the Handbook of Biological Data, American Institute of Biological Sciences, The National Research Council. Paper. Pp. 199, with figures and charts. Price $4.50. W. B. Saunders Company, West Washington Sq., Philadelphia, 1952.

Compilation of the more basic established data on blood composition and reactions was the purpose of this publication. The result is a collection of authoritative data long needed by medical researchists.

Hematologic data from man and other vertebrates are given in 101 tables. Broad collaboration among investigators in hematology and related fields was obtained for selection and review of the tabular data. These tables are unique for their high degree of reliability—data were supplied and valididated by over 600 outstanding investigators in biology and clinical medicine. Exhaustive reviews were made of the tables by experts. The tables are also unusual in treating variables in a comprehensible and directly usable form; no calculation by the reader is necessary.

The volume on blood is the first of a series to be prepared on biologic data. It should prove invaluable to the medical researcher.

TRAINING AND RESEARCH IN STATE MENTAL HEALTH PROGRAMS. A Report to the Governors' Conference. Paper. $5.00. Pp. 349. The Council of State Governments, 1313 East 60th St., Chicago, Illinois, 1953.

This book is reviewed in this issue of THE JOURNAL in the columns of the Bureau of Public Education on Health.

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Conventions and Meetings

Announcements

American Osteopathic Association, Fifty-Eighth Annual Convention, Royal York and King Edward Hotels, Toronto, Canada, July 12-16, inclusive. Program Chairman, Campbell A. Ward, 51 Cass Ave., Mt. Clemens, Mich.

American College of Osteopathic Internists, annual meeting, Philadelphia, October 7-10. Secretary, Glennard E. Lahrson, 460 Staten Ave., Oakland 10, Calif.

American College of Osteopathic Surgeons, annual meeting, Hotel Baker, Dallas, Tex., October 31-November 4. Administrative Secretary, Mrs. O. F. Martin, Box 474, Coral Gables 34, Fla.

American Osteopathic Academy of Orthopedics, annual meeting, Hotel Baker, Dallas, Tex., October 31-November 4. Secretary, J. Paul Leonard, 2673 W. Grand Blvd., Detroit 8. Program Chairman, Walter R. Garard, 809 S. Hobart Blvd., Los Angeles 5.

American Osteopathic College of Anesthesiologists, annual meeting, Hotel Baker, Dallas, Tex., October 31-November 4. Secretary, Crawford M. Esterline, Box 155, Kirksville, Mo. Program Chairman, Armin L. Karbach, 316 N. Center, Arlington, Tex.

American Osteopathic College of Radiology, annual meeting, Hotel Baker, Dallas, Tex., October 31-November 4. Secretary, H. Miles Snyder, Art Centre Hospital, 5435 Woodward Ave., Detroit 2. Program Chairman, John H. Pulker, Flint Osteopathic Hospital, 416 W. Fourth Ave., Flint 4, Mich.

American Osteopathic Hospital Association, annual meeting, Hotel Baker, Dallas, Tex., October 31-November 4. Executive Secretary, Mr. Robert P. Chapman, 1011 Kahl Bldg., 326 Third St., Davenport, Iowa.

American Osteopathic Society of Proctology, annual meeting, Hotel Jefferson, St. Louis, Mo., April 29-May 1. Secretary, Carl S. Stillman, Jr., 3523 Fifth Ave., San Diego 3, Calif. Program Chairman, Felix D. Swope, 609 Farragut Medical Bldg., Washington 6, D. C.

Arizona, annual meeting, Santa Rita Hotel, Tucson, May 7-9. Secretary, Homer E. Allshouse, 2243 N. 12th St., Phoenix 22. Program Chairman, Spencer Ellsworth, 101 W. Ajo Way, Tucson.

Arkansas, annual meeting, Sam Peck Hotel, Little Rock, April 26-27. Secretary, R. M. Packard, 110 E. Huntington Ave., Jonesboro. Program Chairman, C. W. Dalrymple, 318-20 Exchange Bldg., Little Rock.

California, annual meeting, Hotel Del Coronado, Coronado, May 23-26. Executive Secretary, Mr. Thomas C. Schumacher, 1298 Wilshire Blvd., Los Angeles. Program Chairman, Richard W. Johnson, Box O, Arbuckle.

Colorado: See Rocky Mountain Osteopathic Conference.

Florida, annual meeting, Monte Carlo Hotel, Miami Beach, May 13-15. Secretary, Dominic Raffa, 5009 Central Ave., Tampa 3. Program Chairman, William E. White, Manatee Post Office Arcade, Bradenton.

Georgia, annual meeting, Radium Springs, May 7-8. Secretary, Kenneth H. Wiley, 806 Mortgage Guarantee Bldg., Atlanta 3. Program Chairman, Chan L. Plair, 901 Second Ave., Albany.

Hawaii, annual meeting, Honolulu, October 25-27. Secretary, Joseph W. Stella, 38 Young Hotel Bldg., Honolulu 9.

Illinois, annual meeting, Pere Marquette Hotel, Peoria, May 2-4. Executive Secretary, Mr. Douglas Durkin, 5200 E. Ellis Ave., Chicago 15.

Indiana, annual meeting, South Shore Inn, Lake Wawasee, Syracuse, May 9-11. Secretary, F. A. Turfler, Jr., 107 S. William St., South Bend.

Iowa, annual meeting, Hotel Savery, Des Moines, May 23-25. Secretary, Mr. Dwight S. James, 200 Walnut Bldg., Des Moines 9. Program Chairman, John Q. A. Mattern, 806-07 Savings & Loan Bldg., Des Moines 9.

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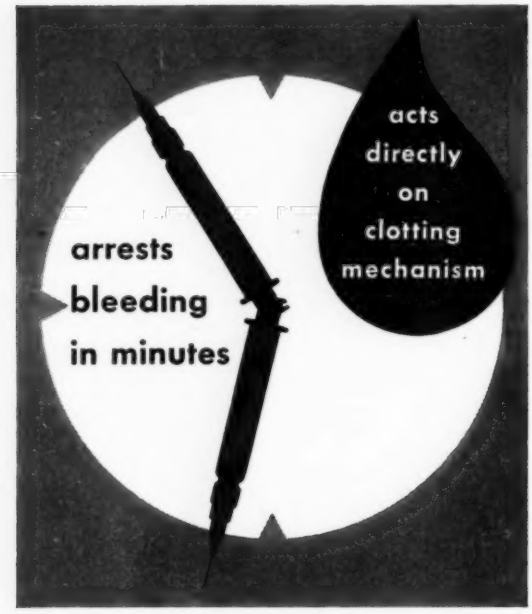

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Kansas, annual meeting, Allis Hotel, Wichita, April 24-28. Executive Secretary, Mr. Lloyd L. Hall, Room 612, National Bank of Topeka Bldg., Topeka. Program Chairman, Robert G. Waddill, 2914 E. Central, Wichita 6.

Kentucky, annual meeting, Brown Hotel, Louisville, September 29-30. Secretary, Harold D. Benteen, 2048 Winchester Ave., Ashland. Program Chairman, Martha Garnett, 417 Fincastle Bldg., Louisville 2.

Maine, annual meeting, Hotel Samoset, Rockland, June 17-19. Executive Secretary, Roswell P. Bates, 72 Main St., Orono.

Michigan, annual meeting, Civic Auditorium, Grand Rapids, October 4-6. Secretary, P. Ralph Morehouse, 214 S. Superior St., Albion. Program Chairman, B. F. Dickinson, 222 E. Sixth St., Royal Oak.

Minnesota, annual meeting, May 7-8. Secretary, E. R. Komarek, 301 Granite Exchange Bldg., St. Cloud.

Missouri, annual meeting, Hotel Colonial and Kentwood Arms Hotel, Springfield, October 13-15. Executive Secretary, Mr. Paul D. Adams, 325 E. McCarty St., Jefferson City. Program Chairman, L. R. Morgan, 3014 S. Main St., Joplin.

New Hampshire, annual meeting, Milville Inn., Concord, May 10. Secretary, Edna C. Waterhouse, Intervale Road, North Conway. Program Chairman, George W. Draper, Jr., 233 Central Ave., Dover.

New Mexico, annual meeting, Franciscan Hotel, Albuquerque, April 29-May 1. Secretary, Robert E. Smith, 205 N. First, Lovington.

New York, annual meeting, Hotel Syracuse, Syracuse, October 15-16. Secretary, Robert E. Cole, 417 S. Main St., Geneva. Program Chairman, Allen S. Prescott, 800 Keith Theatre Bldg., Syracuse 2; co-chairman, Francis J. Beall, Jr., 1429 James St., Syracuse 6.

North Carolina, annual meeting, Battery Park Hotel, Asheville, October 21-23. Secretary, S. Dales Foster, 710 Public Service Bldg., Asheville. Program Chairman, Elizabeth E. Smith, 18 Wall St., Asheville.

North Dakota, annual meeting, Hotel Gardner, Fargo, May 7-8. Secretary, Georgianna Pfeiffer, 110½ Broadway, Fargo. Program Chairman, Gregory S. Mallarian, 1140 Broadway, Fargo.

Northwest Osteopathic Convention, annual meeting, Chinook Hotel, Yakima, Wash., June 21-23. Program Chairman, Wilbert B. Saunders, 4730 University Way, Seattle 5, Wash.

Ohio, annual meeting, Neil House, Columbus, May 2-5. Executive Secretary, Mr. William S. Konold, 50 E. Broad St., Columbus. Program Chairman, Donald J. Ulrich, 141 E. Main St., Kent.

Oklahoma, annual meeting, Biltmore Hotel, Oklahoma City, November 8-10. Executive Secretary, Mr. Walter L. Gray, 210-212 Braniff Bldg., Oklahoma City. Program Chairman, Fred Green, Alva Osteopathic Hospital, 619 Center St., Alva.

Ontario, annual meeting, King Edward Hotel, Toronto, April 24. Secretary and Acting Program Chairman, A. Reid Johnston, 1298 King St., E., Hamilton.

Oregon: See Northwest Osteopathic Convention.

Osteopathic College of Ophthalmology and Otorhinolaryngology, annual meeting, Hotel Statler, Detroit, July 7-9. Executive Secretary, Mr. William S. Konold, 50 E. Broad, St., Columbus, Ohio. Program Chairman, C. P. Harth, 616 S. Main St., Tulsa 3, Okla.

Pennsylvania, annual meeting, Penn Harris Hotel, Harrisburg, September 24-26. Executive Secretary, Mr. George W. Thomas, 510 N. Third St., Harrisburg. Program Chairman, Harry E. Binder, 7247 Charles St., Mayfair, Philadelphia 35.

Rocky Mountain Osteopathic Conference, midyear meeting, Broadmoor Hotel, Colorado Springs, Colo., November 12-14. Secretary, C. Robert Starks, 1459 Ogden St., Denver 18.

South Dakota, annual meeting, Hotel Sawnee, Brookings, June 6-8. Secretary, Earl W. Hewlett, 417 W. 27th St., Sioux Falls. Program Chairman, Carl C. Pascale, Box 36, Centerville.

Texas, annual meeting, Texas Hotel, Fort Worth, April 29-May 1. Executive Secretary, Phil R. Russell, 1837 Hillcrest Ave., Fort Worth 7. Pro-

gram Chairman, Lester Hamilton, 5725 Camp Bowie Blvd., Fort Worth 7.

Utah and Wyoming, joint annual meeting, Logan, Utah, June 26-27. Secretary, Utah Society of Osteopathic Physicians and Surgeons, Alice E. Houghton, 600 Zion's Savings Bank Bldg., Salt Lake City 1. Secretary, Wyoming Association of Osteopathic Physicians and Surgeons, G. A. Roulston, 2823 Central St., Cheyenne. Program Chairman, Wilford G. Hale, 506 W. 2nd South, Logan, Utah.

Virginia, annual meeting, Williamsburg, May 28-29. Secretary, E. Brooks Flickinger, 301 W. Whitlock St., Winchester. Program Chairman, Vincent H. Ober, 407-11 Bankers Trust Bldg., Norfolk 10.

Washington: See Northwest Osteopathic Convention.

West Virginia, annual meeting, Daniel Boone Hotel, Charleston, June 6-8. Secretary, Guy E. Morris, 542 Empire Bank Bldg., Clarksburg. Program Chairman, Donald C. Newell, 137½ Main St., Oak Hill.

Western States Osteopathic Society of Proctology, annual meeting, Shamrock Hotel, Houston, Tex., October 4-6. Secretary, E. F. Walters, 925 E. South Temple St., Salt Lake City 2.

Wisconsin, annual meeting, Hotel Pfister, Milwaukee, April 12-14. Secretary, Edwin J. Elton, 1518 N. 70th St., Wauwatosa 13. Program Chairman, E. G. Anderson, 51 S. Franklin St., Janesville.

Wyoming: See Utah.

State and National Boards

ALABAMA

Examinations June 23-25, State Capitol, Montgomery. Applications must be filed by June 22. Address D. G. Gill, M.D., secretary, Board of Medical Examiners, 537 Dexter Ave., Montgomery 4.

ARIZONA

Those interested in professional examinations should contact Russell Peterson, D.O., secretary, Board of Registration and Examination in Medicine and Surgery, 2747 East McDowell Road, Phoenix.

Basic science examinations June 15, University of Arizona, Tucson. Applications must be filed 2 weeks prior to examination. Address Herbert D. Rhodes, Ph.D., secretary, Basic Science Board, University of Arizona, Tucson.

COLORADO

Professional examinations at Denver, June 8-9. Applications must be filed by May 8. Address Samuel H. Brown, M.D., executive-secretary, Board of Medical Examiners, 831 Republic Bldg., Denver 2.

Basic science examinations in May. Address Esther B. Starks, D.O., secretary, Basic Science Board, 1459 Ogden St., Denver 18.

CONNECTICUT

Basic science examinations June 12, Room 23, Lampson Hall, Yale University, New Haven. Applications must be filed 2 weeks prior to examination. Address Miss M. G. Reynolds, executive assistant, Board of Healing Arts, 52 Whitney Ave., New Haven 10.

DELAWARE

Examinations July 13-15. Address Joseph S. McDaniel, M.D., 229 S. State St., Dover.

FLORIDA

Professional examinations at Hotel Seminole, Jacksonville, June 26-27. Applications must be filed by June 1. Address R. Philip Coker, D.O., secretary, Board of Osteopathic Medical Examiners, Box 66, Panama City.

Basic science examinations June 5 at Gainesville. Applications must be filed by May 25. Address M. W. Emmel, D.V.M., secretary, Board of Examiners in the Basic Sciences, P.O. Box 340, Gainesville.

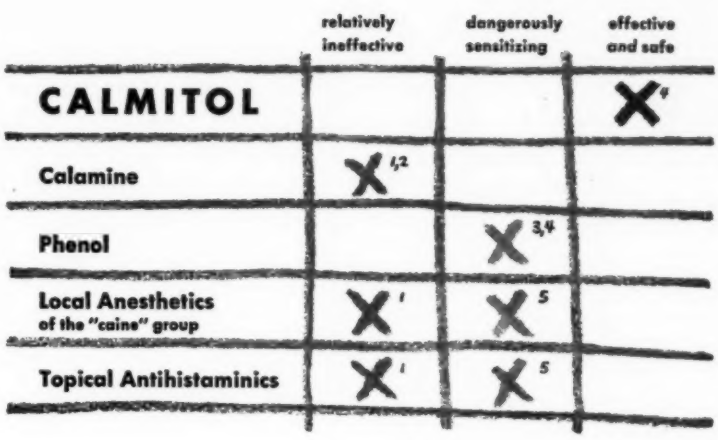
GEORGIA

Examinations July 6 at Atlanta. Address Robert K. Glass, D.O., secretary, Board of Osteopathic Examiners, 834-35 Forsyth Bldg., Atlanta 3.

HAWAII

Examination dates by Territorial Law are usually the first Wednesday, Thursday, and Friday of January, April, July, and October. One of these dates is set

Antipruritic Scoreboard



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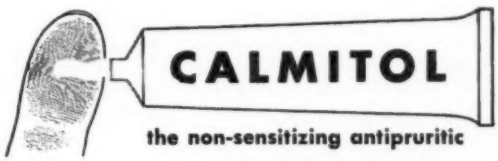
1. Lobitz, W. C., Jr., and Jillson, O. F.: Postgrad. Med. 12:2, 1952.
2. Goodman, H.: J.A.M.A. 129:707, 1945.
3. Underwood, G. B., et al.: J.A.M.A., 130:240, 1946.
4. Lubowe, I. I.: New York State J. Med. 50:1743, 1950.
5. Nomland, R.: Postgrad. Med. 11:412, 1952.



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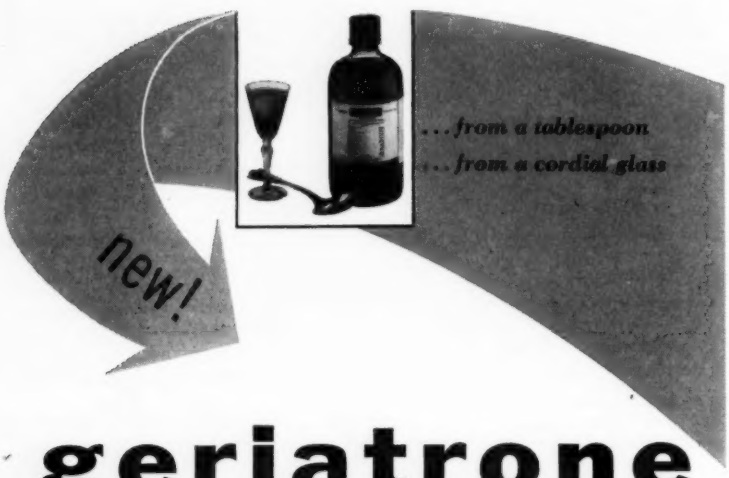

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IDAHO

Examinations June 10 at Boise. Address Mr. Britt Nedry, director, Occupational License Bureau, Department of Law Enforcement, Room 354, State House, Boise.

ILLINOIS

Examinations in Chicago June 22-24. Applications must be filed 2 weeks prior to examination. Address Frederic B. Selcke, Superintendent of Registration, Illinois Department of Registration and Education, State House, Springfield.

IOWA

Basic science examinations July 13. Applications must be filed before the date of examination. Address Ben H. Peterson, Ph.D., secretary, Board of Basic Science Examiners, Coe College, Cedar Rapids.

Professional examinations May 3-4 in the House Chamber, State House, Des Moines. Address Mr. Dwight S. James, assistant secretary, Board of Osteopathic Examiners, 200 Walnut Bldg., Des Moines 9.

KANSAS

Examinations June 17-19 at Topeka. Applications must be filed 30 days prior to examination. Address Forrest H. Kendall, D.O., secretary, Board of Osteopathic Examination and Registration, 420½ Pennsylvania, Holton.

KENTUCKY

Examinations June 7-9, Henry Clay Hotel, Louisville. Address Mrs. Ray Wunderlich, director, Medical Licensure and Registration, Board of Health, 620 S. Third Street, Louisville.

MAINE

Examinations June 8 at Augusta. Address George F. Noel, D.O., secretary, Board of Osteopathic Examination and Registration, Monument Sq., Dover-Foxcroft.

MARYLAND

Examinations in June. Address Christopher L. Ginn, D.O., secretary, Board of Osteopathic Examiners, 419 N. Charles St., Baltimore 1.

MASSACHUSETTS

Examinations July 13. Address Robert C. Cochrane, M.D., secretary, Board of Registration in Medicine, Room 33, State House, Boston 33.

MICHIGAN

Basic science examinations May 14-15. Address Mrs. Anne Baker, secretary, Board of Examiners in the Basic Sciences, 410 W. Allegan, Lansing.

MINNESOTA

Basic science examinations June 1-2, 101 Wesbrook Hall, University Campus, Minneapolis. Applications must be filed by the 10th of the month preceding examination. Address Raymond N. Bieter, M.D., secretary, Board of Examiners in the Basic Sciences, 105 Millard Hall, University of Minnesota, Minneapolis 14.

MISSISSIPPI

Examinations June 21-22, Edwards Hotel, Jackson. Applications should be filed at least a week before examination. Address R. N. Whitfield, M.D., assistant secretary, Board of Health, Jackson.

MISSOURI

Examinations May 27-28 at Kansas City College of Osteopathy and Surgery and Kirksville College of Osteopathy and Surgery. Address F. C. Hopkins, D.O., secretary, Board of Osteopathic Registration and Examination, 205 N. 4th St., Hannibal.

NEBRASKA

Basic science examinations May 4-5. Address Mr. Husted K. Watson, director, Bureau of Examining Boards, Department of Health, State Capitol Bldg., Lincoln 9.

NEVADA

Professional examinations in July. Address Walter J. Walker, D.O., secretary, Board of Osteopathic Examiners, 210 W. Second St., Reno.

Basic science examinations July 6. Address Donald G. Cooney, Ph.D., secretary, Board of Examiners in the Basic Sciences, Box 9005, University Station, Reno.

NEW JERSEY

Examinations June 15-18 at Trenton. Applications must be filed 20 days prior to examination. Address E. S. Hallinger, M.D., secretary, Board of Medical Examiners, 28 W. State St., Trenton.

NEW MEXICO

Basic science examinations April 18. Address Mrs. Marguerite Cantrell, secretary, Board of Examiners in the Basic Sciences, Box 1522, Santa Fe.

NEW YORK

Examinations June 29-July 2 at Albany, Buffalo, New York City, and Syracuse. Applications must be filed by May 20. Address Dr. John W. Paige, Chief, Bureau of Professional Examinations and Registrations, 22 S. Pearl St., Albany.

NORTH CAROLINA

Examinations July 2-3 at Raleigh. Address F. R. Heine, D.O., secretary, Board of Osteopathic Examination and Registration, 926 Southeastern Bldg., Greensboro.

NORTH DAKOTA

Examinations July 10-11. Applications must be filed by June 15. Address G. L. Hamilton, D.O., secretary, Board of Osteopathic Examiners, 119 Main St., South, Minot.

OHIO

Examinations June 14-16 at Columbus. Address H. M. Platter, M.D., secretary, Medical Board, Wyandotte Bldg., Columbus 15.

OKLAHOMA

Basic science examinations April 16-17, University of Oklahoma School of Medicine Auditorium, Oklahoma City. Applications must be filed 10 days prior to examination, if possible. Address the Secretary of State.

OREGON

Professional examinations in July at Portland. Address Wilmot C. Foster, M.D., executive secretary, Board of Medical Examiners, 609 Failing Bldg., Portland 4.

Basic science examinations June 5 at Portland. Address John R. Richards, secretary, State Board of Higher Education, Eugene.

RHODE ISLAND

Professional examinations July 1-2. Professional examinations must be preceded by basic science examinations. Basic science examinations May 12. Applications must be filed 20 days prior to the basic science examination. Address Mr. Thomas B. Casey, Administrator of Professional Regulation, 366 State Office Bldg., Providence.

SOUTH CAROLINA

Examinations June 15 at Columbia. Address Nancy Hoselton, D.O., president, Board of Osteopathic Examiners, 1711 Gervais St., Columbia 1.

SOUTH DAKOTA

Basic science examinations June 11-12, Medical and Science Bldg., University of South Dakota, Vermillion. Applications must be filed by May 28. Address Gregg M. Evans, Ph.D., secretary, Basic Science Board, 310 E. 15th St., Yankton.

TENNESSEE

Examinations in February and July at Nashville. Applications must be filed 15 days prior to examination. Address M. E. Coy, D.O., secretary, Board of Examination and Registration for Osteopathic Physicians, 1226 Highland, Jackson.

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TEXAS

Professional examinations June 21-23, Texas Hotel, Fort Worth. Reciprocity applications must be complete 30 days prior to the meeting date. Address M. H. Crabb, M.D., secretary, Board of Medical Examiners, 1714 Medical Arts Building, Fort Worth 2.

Basic science examinations April 23-24, at Austin. Applications must be completed one week prior to examination. Address Mrs. Betty Ratcliff, chief clerk, Board of Examiners in the Basic Sciences, 407 Perry-Brooks Bldg., Austin.

UTAH

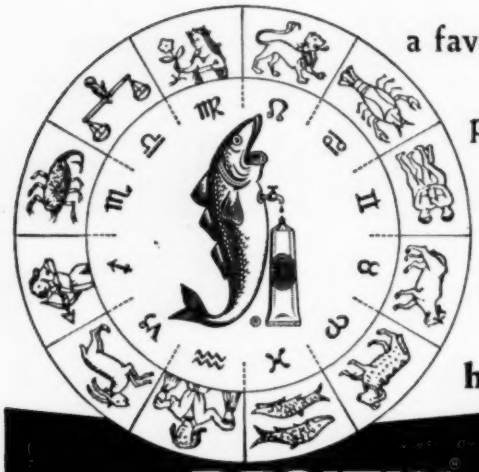
Wilford G. Hale, Logan, has been reappointed to the Osteopathic Examining Committee. His term will expire June 30, 1956.

WASHINGTON

Professional and basic science examinations in July. Address Edward C. Dohm, secretary, Professional Division, Department of Licenses, Olympia.

WEST VIRGINIA

Examinations June 28-29, Shenandoah Hotel, Martinsburg. Applications for licensing by reciprocity must be filed 30 days prior to the meeting. Applications for licensing by examination must be filed 10 days prior to the meeting. Address W. S. Irvin, D.O., secretary, Board of Osteopathy, 202 Broadway, Berkeley Springs.



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70 Ship Street, Providence 2, R. I.

1. Grayzel, H. G., Heimer, C. B., and Grayzel, R. W.: New York St. J. M. 53:2233, 1953.
2. Heimer, C. B., Grayzel, H. G., and Kramer, B.: Archives of Pediatrics 68:382, 1951.
3. Behrman, H. T., Combes, F. C., Bobroff, A., and Leviticus, R.: Ind. Med. & Surgery 18:512, 1949.
4. Turell, R.: New York St. J. M. 50:2282, 1950.

WISCONSIN

Professional examinations July 13-15 at Milwaukee. Address Alvin G. Koehler, M.D., secretary, Board of Medical Examiners, 46 Washington Blvd., Oshkosh.

Basic science examinations June 5 at Hotel Schroeder, Milwaukee. Applications must be filed by May 28. Address William H. Barber, secretary, Board of Examiners in the Basic Sciences, 621 Ransom St., Ripon.

WYOMING

Examinations June 7 at Cheyenne. Address Franklin D. Yoder, M.D., secretary, Board of Medical Examiners, New State Office Bldg., Cheyenne.

REREGISTRATION OF OSTEOPATHIC LICENSES

May 1—Iowa, $1.00. Address Mr. Dwight S. James, assistant secretary, Board of Osteopathic Examiners, 200 Walnut Bldg., Des Moines 9.

May 1—Washington, $2.00. Address Edward C. Dohm, secretary, Professional Division, State Department of Licenses, Olympia.

During June—Hawaii, $5.00 for residents, $2.00 for nonresidents. Address Frank O. Gladding, D.O., secretary, Board of Osteopathic Examiners, 504 Kauikeolani Bldg., Honolulu 13.

Before June 30—Delaware, $20.00. Address Joseph S. McDaniel, M.D., secretary, Board of Medical Examiners, 229 S. State St., Dover.

June 30—Virginia, $1.00. Address K. D. Graves, M.D., secretary, Board of Medical Examiners, 631 First St., S.W., Roanoke.

July 1—Idaho, $10.00. Address Mr. Britt Nedry, director, Occupational License Bureau, Dept. of Law Enforcement, Room 354, State House, Boise.

July 1—Kansas, $5.00. Address Forrest H. Kendall, D.O., secretary, Board of Osteopathic Examination and Registration, 420½ Pennsylvania, Holton.

July 1—Michigan, $5.00. Address P. Ralph Morehouse, D.O., assistant secretary, Board of Osteopathic Registration and Examination, 214 S. Superior St., Albion.

July 1—New Mexico, $5.00. Address H. E. Donovan, D.O., secretary, Board of Osteopathic Examination and Registration, Donovan Osteopathic Hospital, Raton.

July 1—North Dakota, $3.00. Address G. L. Hamilton, D.O., secretary, Board of Osteopathic Examiners, Ringo Bldg., 119 S. Main St., Minot.

July 1—Oklahoma, $2.00. Address Ivan E. Penquite, D.O., secretary, Board of Osteopathy, 202 Clayton Bldg., Sapulpa.

July 1—West Virginia, $2.00. Address W. S. Irvin, D.O., secretary, Board of Osteopathy, 202 Broadway, Berkeley Springs.

Within 60 days after July 1—Indiana, $5.00 for residents, $10.00 for nonresidents. Address C. B. Blakeslee, D.O., secretary, Board of Medical Registration and Examination, 1000 Kahn Bldg., Indianapolis.

EXAMINATION BY NATIONAL BOARD

The National Board of Examiners for Osteopathtic Physicians and Surgeons conducts Parts I and II of its examination on the first Thursday and Friday of each May and December at the six approved colleges. Application blanks may be obtained from the secretary or the dean of the college, and the completed application blank, together with a passport photograph and check for the parts to be taken, must be in the secretary's office by the November 1 or April 1 preceding the examination.

Examinations in Part I consist of anatomy, including histology and embryology; physiology; physiological chemistry; general pathology; and bacteriology, including parasitology and immunology.

Part II consists of examinations in surgery, including applied anatomy, surgical pathology, and surgical specialties; obstetrics and gynecology; pediatrics; neurology and psychiatry; public health, including hygiene; medical jurisprudence; osteopathic principles, therapeutics, including pharmacology and materia.

Part III is an oral and practical examination given in Philadelphia, Chicago, Kirksville, and Los Angeles under the

supervision of a chief examiner who is a member of the Board and by a panel of associate examiners. Subjects covered in Part III are anatomy; physiology; pathology; osteopathic principles, therapeutics, and pharmacology; surgery; ophthalmology and otorhinolaryngology; obstetrics and gynecology; physical and clinical diagnosis; public health and communicable diseases.

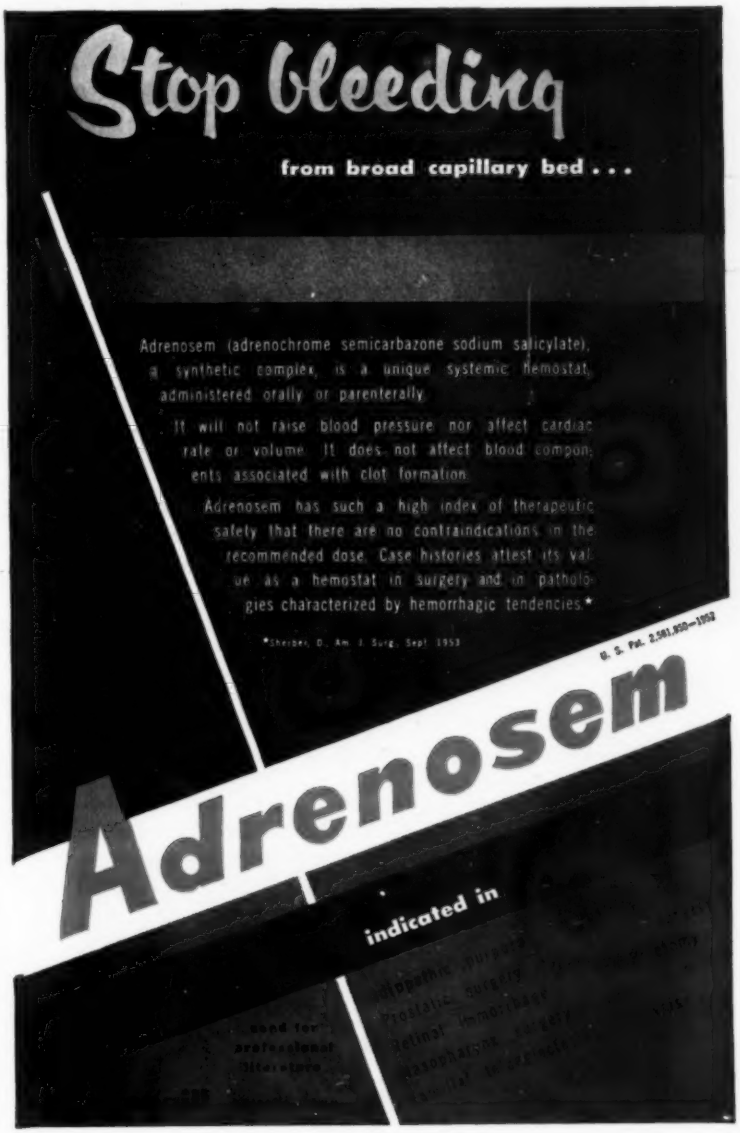
The following Part II examinations are scheduled:

Los Angeles .....May 1-2

These are oral examinations which the candidate may take after having satisfactorily completed the first 6 months of a 1-year internship in a hospital approved by the American Osteopathic Association for intern training. Part III is given annually at the above-named colleges.

Eligibility requirements are as follows: Part I, satisfactory completion of the first 2 years in an approved school of osteopathy; Part II, satisfactory completion of Part I and of the first two quarters or trimesters of the senior year in an approved osteopathic college; Part III, satisfactory completion of Part II and at least 6 months of a 1-year internship approved by the American Osteopathic Association. The internship requirement does not apply to candidates who took Part I prior to July, 1950.

Application must be filed with the secretary of the Board not less than 30 days prior to the examination dates. Address Paul van B. Allen, D.O., secretary, 1512 N. Delaware Street, Indianapolis 2, Indiana.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THE IMPACT OF RESEARCH AND MEDICAL EDUCATION ON PUBLIC HEALTH*

By Chester Scott Keefer, M.D.†
Department of Health, Education, and Welfare

The impact of research and education on the public health has been so great in the past 50 years that its full measure cannot be taken in a few minutes. However, I want to reflect a little about it tonight and to take a long look ahead. Permit me to start with your first conference.

CHANGING HEALTH PROBLEMS

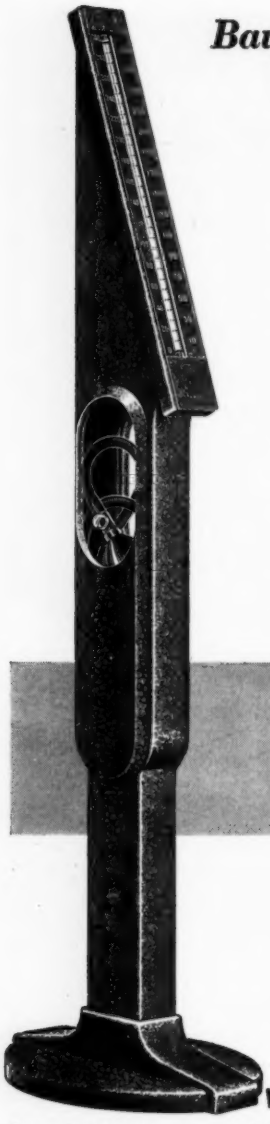
When the first conference of State and Territorial health officers and the Public Health Service was called, shortly after the turn of this century, the major health problems in the United States resembled those of many underdeveloped areas of the world today. The average life expectancy at birth was about 49 years. Infant and maternal mortality rates were high; communicable and infectious diseases were prevalent and were frequent causes of death; relatively little was done to prevent pollution of water supplies and food, and many large cities had open sewer systems.

I am told that the discussions in the first conference and in those of many subsequent years were an exchange of knowledge and experience on ways of improving these conditions, since our country—already embarked on the transition from an agricultural to an industrial economy—recognized human resources as its most precious national wealth. This shift from an agricultural to an industrial economy carried with it an increasing number of health problems. High priority was given in the early years of public health and preventive medicine to bacteriological research, training and demonstrations in environmental sanitation, and interstate cooperation in combating the spread of infectious diseases.

The contrast between the questions considered in your present conference and in that of some 50 years ago is a dramatic proof of the success of research and education in the health services. Specialists in bacteriology, immunology, epidemiology, sanitary engineering, pediatrics, and obstetrics have greatly extended our knowledge of the causes of infectious diseases. The public health profession has developed techniques that, in conjunction with improved standards of living and advances in the practice of medicine, have almost eradicated the sources of many communicable

*Reprinted from *Public Health Reports*, January, 1954.

†Dr. Keefer is Special Assistant for Health and Medical Affairs to the Secretary of Health, Education, and Welfare. He spoke at the annual banquet of the Association of State and Territorial Health Officers in Washington on November 5, 1953.



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diseases. Nearly 20 years has been added to life expectancy at birth. This achievement has resulted largely from declines in the death rates for diphtheria, streptococcic diseases, diarrhea and enteritis, tuberculosis, pneumonia, and other infectious diseases which formerly took the lives of many young children.

Primary emphasis in the early attack against infectious diseases was on prevention and detection. These preventive measures served to reduce the number of cases and carriers, thus decreasing the threat of epidemics. These measures for the prevention and detection of infectious diseases must continue with intensity since they are still with us. Overall death rates do not tell the whole story.

SPECIFIC THERAPY

Specific therapy is a more recent development, stemming from laboratory and clinical research and the development of anti-infective drugs which have further reduced death rates and lessened the hazards of serious and prolonged illness from infections. The use of anti-infective agents has also aided in the prevention of certain diseases.

These successes are at once a source of pride in achievement and a source of confidence in health progress for the future. They are not cause for relaxation of efforts, however, for in many parts of the United States infectious diseases such as tuberculosis and dysentery are still prevalent, and tuberculosis is one of our important chronic diseases. Efforts must be continued on a selective basis to reach the irreducible minimum incidence of morbidity and mortality from infectious diseases in each area and to hold our past gains throughout the Nation. We must also find ways of using and extending our knowledge and experience in an attack against chronic and prolonged illness. The art and science of medicine and public health face the complex problem of preventing, diagnosing, treating, rehabilitating, and minimizing the effects of the chronic conditions that are now leading causes of death and disability.

In the early 1900's heart disease, arteriosclerosis, cancer, diabetes, and mental disorders received scant attention as public health problems, since only about 18 percent of the population survived the hazards of acute infectious diseases to reach age 45. Only an extremely hardy 4 percent lived to celebrate their 65th birthday. These chronic diseases, though found at all ages, strike hardest in the later years of life. The proportion of the aged has now doubled and is still increasing, while well over 25 percent of our population has reached or passed age 45, and half of the deaths in this country occur in the age group of over 65 years.

RESEARCH NEEDS

With the past as prologue in public health, a conference of State and Territorial health officers 50 years hence will unquestionably recount spectacular gains in lessening the prevalence and severity of many of these chronic conditions. Let me outline briefly my views of some urgent needs in an all-out attack against chronic illness.

First, we need precise knowledge of the extent of the chronic disease problem. That knowledge can be gained by local, State, and national surveys to derive estimates of the number of persons suffering from chronic illnesses and impairments. The surveys should be designed to reveal information in terms of geographic areas, age groups, income levels, diagnoses, duration of the condition, and potentialities for rehabilitation and self-support.

Research efforts must also be directed toward analysis of the natural history of chronic diseases, to discover any genetic and constitutional factors that predispose people to hypertension, diabetes, rheumatism, arthritis, ulcers, allergies, and mental and nervous disorders, as well as to assess the influence of diet, housing, working conditions, and physical and emotional stresses that may play a part in the development of these conditions. Research must also extend our knowledge of the aging process to determine what constitutional and environmental factors are associated with a physically and mentally active old age.

for infirmity and old age are not synonymous.

Treatment of chronic illness requires more active participation by the patient than is usually necessary in acute illness. Research in the factors that motivate people to act for their health is therefore needed to give us clearer guidance than we now have in our efforts to help the disabled and the aged to make the most of their remaining capacities for self-care and economic independence.

Research and pilot demonstrations must point the way toward more effective means of early case finding, exact diagnosis, referral for medical treatment, followup, prompt rehabilitation, and suitable employment for those who suffer from chronic illness. These measures will not only reduce human suffering and increase our manpower, but will also help to lessen the burden of public aid. Study of the recipients of public assistance, for example, reveals the striking extent to which illness has made it necessary for people to seek public aid. Prompt attention to their chronic ailments might well have forestalled the incapacity for self-support. Of those drawing relief for permanent disability, 40 percent in 30 States reported that 10 years or more had elapsed since the onset of their major impairment. The size of old-age assistance rolls is also an indictment of our failure to preserve or restore and utilize the working capacity of the aged.

A pressing problem of the future is to keep as many aged and incapacitated people as possible out of hospitals and other institutions and to treat them in their own homes. State and Territorial health officers, with their responsibilities for helping and advising States in planning for the construction of hospitals under the Hill-Burton Act, are in a strategic position to influence more appropriate planning for the aged and the chronically ill. Hospitals should be planned in such a way as to extend the availability of outpatient departments, rehabilitation services, and home care arrangements. Prolonged stays in hospitals and custodial institutions, without dynamic programs of rehabilitation, tend to increase the apathy and helplessness of the aged and those incapacitated by chronic disease.

We must, therefore, develop and apply more widely throughout the country better and cheaper methods of caring for the chronically ill and the handicapped, improving their housing conditions, their participation in community activities and their opportunities for independence and self-care. Since many different organizations are needed in this endeavor, we must have effective teamwork among all individuals and agencies in the community concerned with the care of the incapacitated. The difficulty of utilizing all available resources and the necessity for teamwork are revealed by the fact that my home community, the greater Boston area, has 400 separate health agencies. A rural county in the midwest with less than 1,000 people in its largest town had as many as 14 agencies offering some services to the chronically ill. Cooperation, coordination, and systematic referral among these agencies not only prevent duplication of effort and improve efficiency, and hence economy, but also reduce the time lag in providing the types of treatment and rehabilitative services needed by the patient in successive stages of his illness.

ENCOURAGING DEVELOPMENTS

This sketch of the focus of some efforts needed to combat chronic illness does not mean that beginnings have not been made in many of the directions I have outlined.

Among the many encouraging developments I might mention is the far-flung network of research being aided by grants from the Public Health Service, as well as the new approach to integrated laboratory and clinical investigation being started at the Clinical Center in Bethesda. These approaches to solution of the mysteries of chronic illness need no amplification for this audience.

The recent report on schools of public health, published by the Public Health Service, gives heartening evidence of the trend toward greater concern with chronic illness in training public health workers. It also indicates that health departments frequently serve as training and demonstration centers for students of public health. This development provides a close link between research, education, and application of knowledge.

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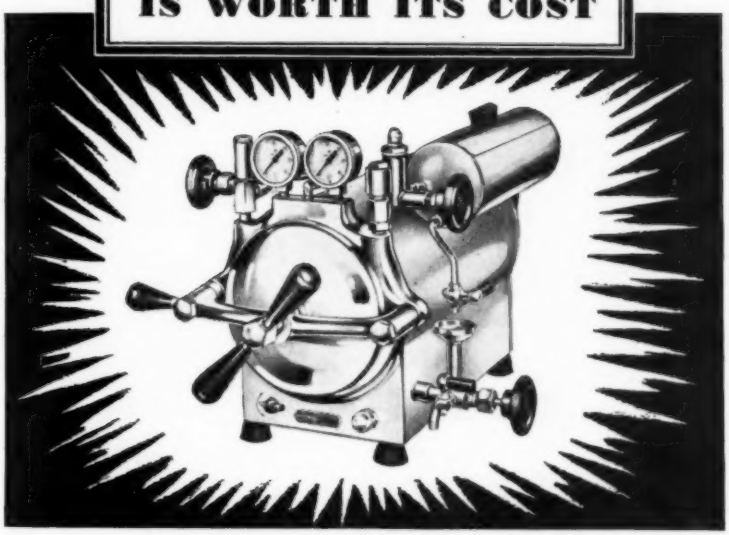

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A particularly encouraging approach is described in the report on preventive medicine in medical schools, which forms part two of the October number of the *Journal of Medical Education*. If you have not already read that report, I commend it to your attention. It indicates many ways in which medical schools are attempting to help their students acquire a clearer understanding of patients as people. Many medical schools give students an opportunity, through home care and similar courses, to observe and analyze the social and environmental factors in illness, and to collaborate with nurses, occupational and physical therapists, and medical social workers in caring for patients.

It would be my hope that the health departments would extend their interests to the educational institutions on a wider base. We have much to learn and much to gain from a closer relationship and a better understanding of health problems as they exist in the community.

In addition to their use in training medical students and visiting nurses, home care programs afford means of providing integrated services in the patient's home. Under several programs patients who remain at home receive services from physicians, visiting nurses, physical and occupational therapists, and medical social workers, in accordance with their requirements for treatment, health guidance, rehabilitation, and social services. A health department, particularly in a community that lacks teaching hospitals, can perform outstanding community service by analyzing what components are needed in a good home care program and in helping the community to decide who should administer it. The health department also can help private physicians by providing them with the services of visiting nurses and others needed in the home care of their patients.

Lastly, I call your attention to the forthcoming conference on care of the long-term patient being sponsored by the Commission of Chronic Illness, the Public Health Service, the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association. Study groups preparing for that conference in March 1954 are assembling facts and standards for services to patients at home and in institutions. Other study groups are concentrating on needs for integration of services and facilities, on research, and on methods of financing services. Physicians, nurses, social workers, public health specialists, medical educators, insurance groups, hospital directors, and representatives of industry and labor are pooling their knowledge and experience in this endeavor. Findings and recommendations of that conference should suggest patterns for desirable relationships among services, facilities, and programs.

CHALLENGE TO THE PROFESSION

In these developments I foresee an expanding and challenging role for health departments. They can collaborate with medical schools and other institutions training for the health professions by participating in research and in demonstrations of public health practice. They can serve as centers for the administration of medical services to the needy or for advice and help in planning those services. They can give advice and leadership in analyzing a community's needs for institutional facilities and rehabilitation departments and for special groups of personnel, such as visiting nurses, physical and occupational therapists, nutritionists, to provide more services to patients in their homes. With their new responsibilities for licensing nursing homes, they can promote higher standards of safety and care in those facilities, and can act as informational and referral centers to aid in more effective use of such homes. They can help private physicians obtain the services of various community organizations in the care of patients in their homes so that the most appropriate type of service will be available in progressive stages of the illness.

In one field, maternal and child health, great strides have been made in developing and applying methods for health education, periodic examination, diagnostic services, and referral for treatment and rehabilitation. Given the knowledge and the will, it is within the power of the health professions to do as much for all age groups, including the aged.

The advances in the past have resulted from the application of new knowledge. Advances in the future will likewise result from new knowledge and its transmission through education and public health practice. The shift in emphasis will be to keep well people well and to rehabilitate the handicapped so that as many people as possible will be able to lead useful and productive lives. You ladies and gentlemen of the public health professions can continue to take the leadership in this important field of activity in the future as you have in the past.

THREE RESEARCH DEVELOPMENTS IN TUBERCULOSIS CONTROL*

SPUTUM CULTURE TECHNIQUE ADOPTED BY NEW YORK

The New York City Department of Health has adopted a new laboratory program of culturing sputums of all its unhospitalized tuberculosis patients in order to evaluate their progress while under treatment, and of routine testing of tubercle bacilli for sensitivity to the drugs employed. Daniel Widelock, Ph.D., and Arthur B. Robins, M.D., Dr.P.H., assistant director and director, respectively, of the department's bureau of laboratories and bureau of tuberculosis, so reported to the epidemiology and laboratory sections of the APHA.

Under a health department program begun in July 1953 for the antibacterial treatment of unhospitalized patients with tuberculosis, both the clinics and the laboratory consider all such patients as candidates for treatment, they reported, and the health department laboratory now offers service "equivalent to that of a good tuberculosis hospital laboratory."

The smear technique is no longer part of the laboratory routine, they continued. All sputums of unhospitalized patients participating in the programs are cultured. Reports are made on the basis of colony counts, reported as 4 plus for "confluent growth, no particulate colonies," down to "less than 1 plus," for "under 50 colonies; number of colonies reported as found."

Drug Sensitivity

Sputums are tested routinely for sensitivity to 1.0 microgram of isoniazid and to "the usual" 100 micrograms of streptomycin. Drug sensitivity is determined by direct inoculation of sputum concentrates on drug-free as well as drug-containing culture media. The laboratory has found that an increase in drug resistance and in culture count usually follows the appearance of colonies of organisms on media containing "as little as 0.1 microgram of isoniazid per milliliter." Resistance to this amount of the drug "is to be considered a warning that greater resistance may soon develop, and if resistance is present to 1 or 5 micrograms of isoniazid "it is probable that the culture count will remain 1 plus and in most instances 2 to 4 plus," the investigators stated.

With reports such as this on culture count and drug sensitivity the bacteriological progress of the unhospitalized patient can be determined while he is under treatment, Widelock and Robins concluded. Results of the tests can be plotted to show his progress and to indicate probable virulence of tubercle bacilli resistant to isoniazid.

*Abstracts of papers presented at the eighty-first annual meeting of the American Public Health Association. Reprinted from *Public Health Reports*, February, 1954.

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Reference to RHINALGAN:
1. Van Alyea, O. E., and Donnelly, W. A.: E.E.N.&T. Monthly, 31, Nov. 1952.
2. Fox, S. L.: AMA Arch. Otolaryn., 53, 607-609, 1951.
3. Malamut, N., and Harber, A.: N.Y. Phys., 34, 14-18, 1950.
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PHIPPS INSTITUTE TESTS TUBERCULIN POTENCIES

Striking differences in the potency of various samples of old tuberculin and different purified tuberculins, brought out by comparative tuberculin tests on BCG vaccinated persons, were reported by three research workers from the Henry Phipps Institute, University of Pennsylvania. Unvaccinated persons with a high level of tuberculin hypersensitivity are less favorable subjects for determining tuberculin potency than groups with a low level of sensitivity such as results from BCG vaccination, according to the investigators, Joseph D. Aronson, M.D., professor of bacteriology; Helen C. Taylor, R.N., and Marie T. McGettigan, R.N., research nurses.

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"Old tuberculin continues to be prepared with but slight modification in the same manner as originally prescribed by Koch in 1891. The procedures used by different investigators to obtain purified tuberculin vary in some detail," the group explained.

The researchers compared the reactive values of old tuberculin (OT) and several purified tuberculins; PPD (purified protein derivative prepared by Seibert with trichloracetic acid), RT and PT ("renset tuberculin" and "purified tuberculin," respectively, both prepared at the State Serum Institute, Copenhagen), "Weybridge PPD" (prepared in Weybridge, England), and PPD-S (purified protein derivative-standard prepared by Seibert and Glenn with ammonium sulfate).

Test Results

Among unvaccinated persons with a high level of tuberculin hypersensitivity, the incidence of positive tuberculin reactions was approximately the same to 0.01 mg. of OT, to 0.00002 mg. of PPD, to the same amounts of Weybridge PPD and PPD-S, and to 1 unit of RT or PT, the University of Pennsylvania group reported. Tablets of PPD-S gave a lower incidence of positive reactions among unvaccinated persons than did the liquid PPD-S, according to the investigators.

Among persons vaccinated with BCG vaccine 2 to 5 months before being tested, the incidence of positive tuberculin reactions was approximately the same with 0.1 mg. of OT, with 0.0002 mg. of Weybridge PPD, and with 10 units of RT or PT, the group said and added that the reaction was considerably lower with 0.0001 mg. PPD-S. Tablets of PPD-S manufactured by 2 companies gave 47 percent and 58 percent fewer reactions, respectively, than did OT when the PPD-S tablets and OT were given vaccinated individuals, it was reported.

Approximately the same percentage of BCG vaccinated persons reacted to 0.0002 mg., Avian PPD (Weybridge, England) as to 0.1 mg. OT while 25 percent fewer persons reacted to 0.0001 mg. balnei PPD (Weybridge, England) than to 0.1 mg. OT, Aronson and his colleagues said.

In their opinion, the "patch test" with OT is less sensitive in both unvaccinated and vaccinated adults than the intracutaneous tuberculin test with OT or PPD-S.

HOME CARE IN PITTSBURGH REDUCES HOSPITAL STAY

An estimated reduction of approximately 50 percent in the period of hospitalization for pulmonary tuberculosis was achieved recently by cautiously discharging selected patients from the City Tuberculosis Hospital in Pittsburgh and continuing directed treatment with isoniazid at their homes, according to a study reported by four members of the Pittsburgh Department of Public Health.

Authors of the paper are Merle Bundy, M.D., M.P.H., chief, tuberculosis control

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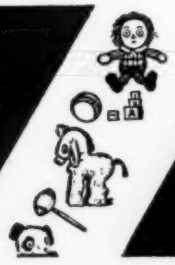

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division of the Pittsburgh Department of Public Health; George E. Martin, M.D., medical director of the Pittsburgh City Tuberculosis Hospital; I. Hope Alexander, M.D., director, and Carl C. Kuehn, M.D., M.P.H., deputy director of the Department of Public Health.

A favorable outlook for recovery from pulmonary tuberculosis, as indicated by sputum tests and X-ray reports, governed selection of the patients, they stated. Home conditions and the patient's psychological attitude were also factors in the choice of patients, the physicians reported.

Isoniazid at Home

The experiment of home treatment was undertaken, the group said, when a metropolitan area X-ray survey indicated that an "avalanche of new cases" was expected for the Pittsburgh City Hospital, which already had a waiting list varying from 75 to 90. The average length of hospital stay had gradually increased by 1952 to almost 13 months, they reported, and isoniazid was the only active treatment given to many patients.

The decision to continue isoniazid treatment in the patient's home resulted in producing a surplus of from 40 to 50 beds, the physicians said. They said that during a 10-month period ending March 31, 1953, 55 percent of the live discharges left the hospital much sooner than would ordinarily have been expected. In addition to the patients who were discharged for home treatment with isoniazid, this percentage includes an additional group of patients who received streptomycin and para-aminosalicylic acid (PAS) after leaving the city hospital, the Pittsburgh physicians said.

The isoniazid-treated patients had already received, on the average, more than 50 gm. of streptomycin and were considered "streptomycin failures," said Bundy and his co-workers. Despite this fact, the physicians continued, 36 percent of the group were discharged within 8 months after admission. Many of these patients were in a far advanced stage of pulmonary tuberculosis at the time of admission and had been in the hospital 1 or more years, even before isoniazid was available, they said in discussing a series of tables.

Bundy and his associates said the high percentage within 8 months was encouraging. Fifty percent of the group receiving streptomycin were discharged from the hospital within that period of time, they continued. "This indicates that when the patients respond to chemotherapy a favorable response of 50 percent of the cases may be expected in 6 to 8 months, or sooner," said the physicians.

Low Failure Rate

One hundred and eleven patients, or 35 percent of the live discharges from June 1, 1952, to March 31, 1953, were continued on isoniazid after discharge from the hospital, said Bundy and his coworkers. "There were 3 failures, or less than 3 percent reported in this period, with 2 of the patients successfully re-treated and the third yet to be tried on readmission. Sixty-one patients, or 20 percent of the live discharges during the period, had been treated or were continued on streptomycin and PAS. There were 4 failures, or 7 percent in this group. . . . These failure rates contrast markedly with the average of a 32 percent readmission rate to the hospital in any 1 year," they continued.

The public health physicians stressed the importance of continued medical observation of the discharged patients who, after 17 months, are still maintained on isoniazid or streptomycin and PAS.

The transfer from the hospital to that of the home atmosphere contributes as much to the patient's recovery as close hospital supervision, the physicians believe. It is planned to continue the procedure, they said. If the need for hospital beds should again become great, a similar project for patients who had never been hospitalized will be instituted, they reported.

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AGENDA FOR A CRITICAL EXPLORATION OF CURRENT PROBLEMS IN MEDICAL CARE*

By E. M. Bluestone, M.D.

(Continued from March JOURNAL*)*

16. If integration is not accepted as a wholesome trend in the management of the tuberculous or the mental patient, what alternative structural and func-

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tional plan can we safely fashion? Specifically, we have yet to express ourselves firmly on the place of the mental patient in (*a*) the mental institution, (*b*) the home for the aged, (*c*) the home for incurables, (*d*) the nursing homes, and (*e*) all other custodial types of institution. Much of this applies to the tuberculous patient. To what extent is it desirable to alienate either of these patients from the environment generally, to which they will be expected to return, and their families.

17. An essential part of the study of this pressing and vital problem is an item about the significance of a waiting list of patients for admission to a hospital and rejected applicants for admission. What is the effect of a waiting list on hospital morale as well as on the patient himself? At this point there must be an offer of alternative methods of care. This study would be incomplete without a thorough analysis of rejectees in any medical establishment. A hospital must not only know and understand what it does, it must know and understand what it does not do, and then help to make good the difference.

18. No study of medical care can be complete without an analysis of the relationship of housing in the community to the program of hospital care. Throughout the ages at least one reason for the existence of the hospital has been the inadequacy of home facilities during certain phases of illness. Such an analysis would lead into a field of study which would produce, in the end, far better use of hospital beds than we have thus far seen, while individualizing the care of the patient outside as well as inside of the hospital.

19. The requirements of good chronic care as seen from the angle of social (environmental) medicine should be considered carefully. A clear statement should be issued after careful study of these requirements, and facilities should thereafter be adjusted to meet these requirements. Specifically, is the home for incurables, home for the aged, convalescent home, nursing home, or hospital for chronic diseases, the best place for this kind of patient? If so, why? If not, why not?

20. How shall the vicious circle between poverty and prolonged illness be broken? At what point does a person require the kind of assistance, social or medical, which will prevent poverty from precipitating prolonged illness and prolonged illness from precipitating poverty? In the long run, they do their deadly work together.

21. What standards should be recommended for the establishment of substitute homes for the homeless patient

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and for the home-poor patient when intramural hospital service is not indicated? Should medical facilities be added to these substitute resources and, if so, to what extent? If not, how can these substitute homes be related to the work of the general hospital? In some instances only a custodial type of care is required, but in more instances continuous medical care is required. If general hospitals transfer their undesired patients to less capable hands at a time when scientific medical care is most needed, how shall this practice be controlled?

22. In the analysis and the evaluation of the reasons for the current practice of transferring patients from the so-called acute general hospitals to second-class institutions, we should deal specifically with (*a*) the financial reason for transfer, including a statement of remedies; (*b*) the medical reason, including a statement of remedies; and (*c*) lack of space, including a statement of remedies.

23. How shall we define and evaluate for practical purposes such new terms as "geriatrics" and "gerontology" in relation to medical care? What are their possibilities and what are their limitations? Is geriatrics a separate specialty like pediatrics, or a problem in acute illness or prolonged illness as the case might be? In other words, at what point in the calendar of a man's life are we justified in making any kind of arrangements for his medical care that may deprive him of the best that is available to those who were born into the world after him?

24. What is the relative emphasis that is being placed on various phases and stages of illness and, in particular, the duration of illness? To what extent does the pressure of urgency dominate planning and how much consideration can be given to nonurgent conditions, which may, in fact, be far more frequent and far more devastating in their prolonged effects?

25. An important item on the agenda is the need for placing responsibility for correct and up-to-date planning. Who is responsible when a person is deprived of the kind of social and medical care that he may need at various critical periods in his life? There must be a level at which responsibility can be fixed. What is this level and how shall it be controlled?

26. Since prolonged illness characteristically exhibits diminishing financial returns from patient sources, how shall we make up the social and medical deficit to enable us to restore the sick man to partial or complete usefulness in his community? What are the relative posi-

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tions of government and philanthropy in an effort like this and what is the position of the practicing medical profession toward this financial problem which involves them automatically? Can we buy medical time and medical interest with money and with opportunity? If so, under what conditions?

27. As we deliberate on the question of financial currency in relation to the care of the patient, we should give some thought to clinical currency. Specifically, to what extent should such a subject as prolonged illness influence medical education and medical research in the hospital, in the home, and in the substitute for the patient's home?

28. An important item on the agenda is an open-minded study of the principle of full-time medical service in the top clinical and laboratory divisions. What are the relative merits of full-time hospital service and the kind of prevailing voluntary service in hospitals which compels intramural and extramural competition for the service of physicians?

29. Since the poor may always be with us and since the intermediate type of institution—too often a substitute for the general hospital—will doubtless prevail for some time to come, what structural and functional obligations shall we impose on it? I refer here specifically to the possibilities of preventive medicine at one end and rehabilitation at the other.

30. What responsibility shall be assigned and what agency shall publicize any new patterns which may evolve? What methods shall we recommend to obtain the acceptance of the public generally as well as interested persons specifically?

Omitted from this presentation are those problems in political economy which, to be sure, have a strong bearing on the agenda. While I am concerned primarily with good medical care for everyone, regardless of age, social condition, duration of illness or the illness itself, environmental medicine teaches that employment and a good economic background are prime factors in preventing disease or its consequences. Business and industry have a strong contribution to make in prevention, first by the application of the principles of industrial hygiene and occupational medicine, and second by encouraging a program of rehabilitation that will enable the recently sick to return to work. Fortunately, much successful experimental evidence is available to enable us to reach decisions on most, if not all, of the items enumerated in this agenda. We are left, therefore, with the need for adjusting the social and medical resources evolving patterns of care. Needless to add, there are many opportunities for additional experimental work on a continuing basis until problems like these can be resolved.

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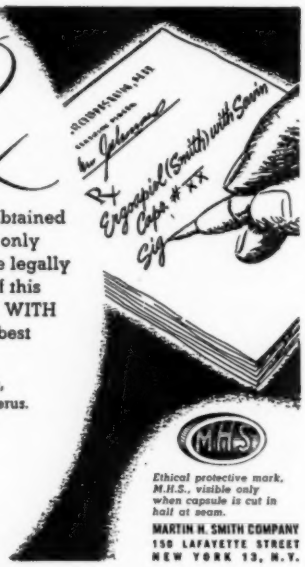

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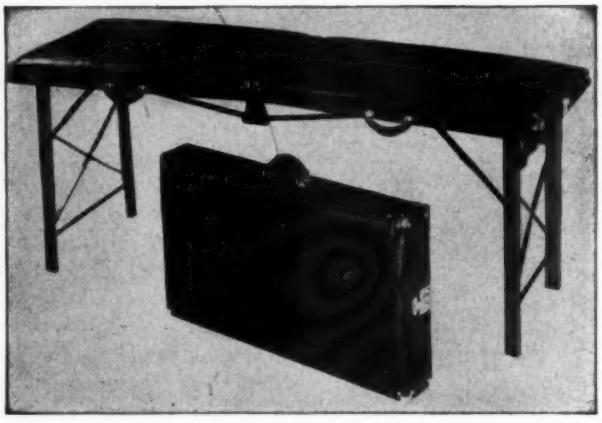

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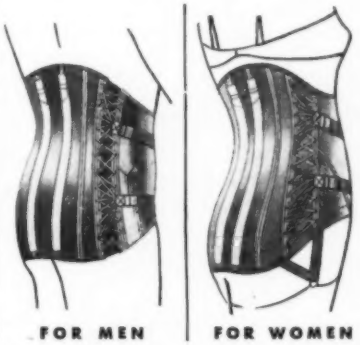

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American Bakers Assn. 36
American Felsol Co. 65
American Osteopathic Association 62, 64
American Sterilizer Co. 27
Ames Company, Inc. 14
Armour Laboratories 13
Arnar-Stone Co. 59
B. F. Ascher Co. 66
Atlas Pharmaceutical Labs., Inc. 32
Averst, McKenna & Harrison, Lt. 9

Baum, W. A., Co., Inc. 50
Borcherdt Malt Extract Co. 57, 58
Borden Company 28, 29
Bristol-Myers Co. ..... Cover II
Burdick Corp. 52
Burton, Parsons & Company 43

Ca-Ma-Sil Company 58
Camp, S. H., & Company 61
Carnation Co. 33
Wilmot Castle Co. 37
Central Pharmacal Co. 15
Chal-Yon Corp. 64
Chatham Pharmaceuticals, Inc. 44
Ciba, Pharmaceutical Products, Inc. ..... Cover IV
Cobbe Phar. Div.—Borcherdt Malt 57
Columbus Pharmacal Co. 54
Crookes Laboratories, Inc. 18

Dartell Laboratories 54
F. A. Davis Co. 34
Desitin Chemical Co. 48
Doho Chemical Corp. 53

Florida Citrus Commission 30
Freeman Mfg. Co. 63

General Electric Co. 20
Gerber's 41
Gomco Surgical Mfg. Corp. 7

Horlicks Corporation 26

Irwin, Neisler & Co. 5

Kidde Mfg. Co. 64

Lakeside Lab. 40
Lea & Febiger 26
Thos. Leeming & Co., Inc. 45, 47

Massengill, S. E., Co. 49, 55

Nepera Chemical Co. 12

Ortho Pharmaceutical Co. 22

Pelton & Crane Co. 51
Pet Milk Co. 35
Physician's Drug & Supply Co. 26
Picker X-Ray Corp. 1
Professional Equipment Co. 19
Professional Foods 62
Professional Printing Co. 60

Ralston Purina Company 6
Raytheon Mfg. Co. 24
Ritter & Co., Inc. 57
Roerig, J. B. & Co. 16, 17, 25, 42

Sandoz Pharmaceuticals 59
Saunders, W. B., Company ..... Cover I
Schenley Laboratories 11
Schering Corp. 3, 21
Shield Laboratories 39
Smith, Martin H., Co. 60
Smith-Dorsey 8
Stuart Company 23
Sunkist Growers 10

Tampax Co. 63
S. J. Tutag Co. 32

U. S. Vitamin Corp. 46
Varick Pharmacal Co. 31
Vitaminerals, Inc. 38

Wocher, Max & Co. 34
Woodard Laboratories 56
Wyeth ..... Cover III, 4

Young, F. E. & Co., Inc. 32

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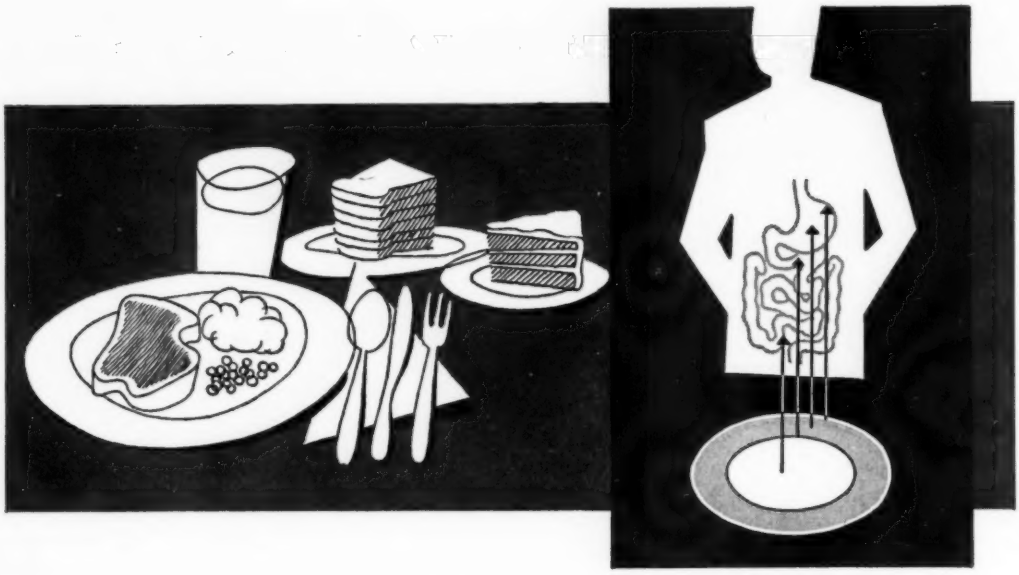

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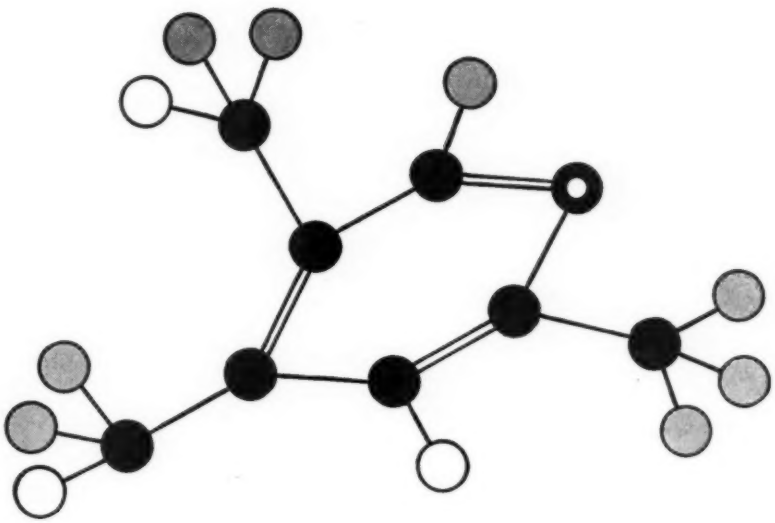

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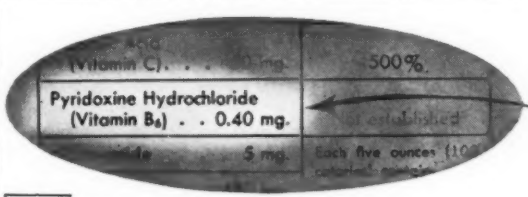

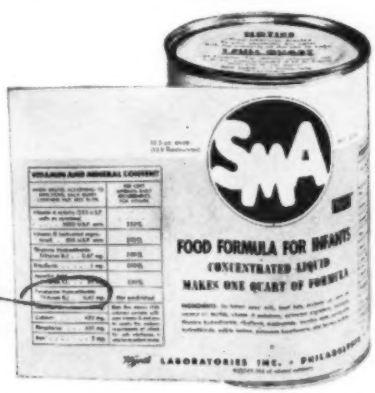

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